SIEMENS

SONOLINE G20 Ultrasound Imaging System
System Reference

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Siemens Medical Solutions USA, Inc.

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SONOLINE G20
Ultrasound Imaging System
System Reference

Software Versions 1 and 2

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CE Declaration

This product is provided with a CE marking in accordance with the regulations stated in Council Directive 93/42/EEC of June 14, 1993 concerning Medical Devices. Siemens Medical Solutions USA, Inc., is certified by Notified Body 0123 to Annex II.3 – Full Quality System.

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Siemens reserves the right to change system specifications at any time.

About This Manual

The Instructions for Use consists of two volumes:

- [1] Instructions for Use

  The *[1] Instructions for Use* includes both a general overview and a technical description of the ultrasound imaging system. This manual contains detailed information on the safety and care of the ultrasound system and its transducers. A chapter is dedicated to the description of all system controls. The *[1] Instructions for Use* also includes the procedures for system setup and beginning an exam.

- [2] Instructions for Use

  The *[2] Instructions for Use* includes procedures for acquiring and optimizing images. This manual provides procedures for general and exam-specific measurements and calculations.

The *System Reference* provides reference information for the ultrasound imaging system.

Conventions

Conventions used throughout this manual are listed below. Take a moment to familiarize yourself with these conventions.

Cross-References

This manual provides you information by topic. When additional information exists within this or other manuals, a reference graphic and the name of the book is provided in the right column. If the information exists within the chapter, a cross-reference to the page number is listed. Otherwise, information is referenced by chapter number.

[1] Instructions for Use

Screen Saver	Ch 1
Intended Use	Ch 1

[2] Instructions for Use

Imaging Functions	ChA1

System Presets

You can use the options and settings available in the system presets menu to set up the ultrasound system with your preferences. Presets define the configuration of the system software whenever you power on the system.

A complete listing of system presets is located in the *System Reference*. Whenever a system preset is discussed in other chapters or in the User and Reference Manuals, a graphic is provided in the right column.

System Reference

Accessories and Options	Ch 2

The graphic identifies a preset option or setting in the system presets menu that is available for you to customize your ultrasound system. The name of the category on the menu containing the system preset is listed for your convenience.

F6

Default Settings
▶ Automatic Freeze Response

Warnings, Cautions, and Notes

⚠ **WARNING:** Warnings are intended to alert you to the importance of following the correct operating procedures where risk of injury to the patient or system user exists.

⚠ **Caution:** Cautions are intended to alert you to the importance of following correct operating procedures to prevent the risk of damage to the system.

Note: Notes contain information concerning the proper use of the system and/or correct execution of a procedure.

Control Panel Keys, Controls, and Menu Selections

Keys and controls located on the control panel are identified by uppercase, boldface type.

Example: Rotate the **DEPTH/ZOOM** control.

Function keys located on the keyboard are identified by the number of the function key.

Example: Press the **F6** key.

Menu selections are indicated with the name of the selection in boldface type.

Example: Select **Next** to access the second page of on-screen menu selections.

Selection of On-Screen Objects

The **SET** key on the control panel functions as a point-and-select device (similar to a computer mouse) when used with the trackball. To select an on-screen object such as a button or a ▼ symbol, roll the trackball to position the pointer (cursor) on the object and then press the **SET** key on the control panel.

In this manual, the term "select" or "click" describe the trackball and **SET** key action required to select an on-screen object. In the example below, phrases A, B, C, and D are equivalent actions.

A. Roll the trackball to the **Search** button and then press the **SET** key.

B. Select the **Search** button.

C. Click the **Search** button.

D. Click **Search**.

Special Terms and Menu Options

Special terms are indicated in boldface italics and are accompanied by a brief description on their first use in the manual.

Example: Provides on-screen anatomical graphics of ***pictograms*** that indicate the anatomy under evaluation.

Within a procedure, options in the system presets are identified in text as boldface type.

Example: Highlight the **Keyboard – Annotation** option.

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System Reference

Note: Not all features and options described in this publication are available to all users. Please check with your Siemens representative to determine the current availability of features and options.

1 Acoustic Output Reference

Transducer Technical Data and Acoustic Output

The assessment of the biological effects of diagnostic ultrasound on humans is a subject of ongoing scientific research. This system, and all diagnostic ultrasound procedures, should be used for valid reasons, for the shortest possible period of time, and at the lowest mechanical and thermal indices necessary to produce clinically acceptable images.

According to the ALARA (As Low As Reasonably Achievable) principles, acoustic output should be set to the lowest level required to satisfactorily perform the examination.

The ultrasound imaging system complies with the standards of the American Institute of Ultrasound in Medicine (AIUM), the National Electrical Manufacturer's Association (NEMA), the guidelines of the United States Food and Drug Administration (FDA), and the guidelines of the International Electrotechnical Commission (IEC) in terms of safety and acoustic output levels. The ultrasound output levels are stated to permit the user to critically evaluate the system settings in the event of new research findings being announced.

For systems distributed within the United States of America, the *Medical Ultrasound Safety* ultrasound education program brochure produced by the AIUM is included at the end of this manual. Refer to this brochure for information relating to the bioeffects and biophysics and prudent use of diagnostic ultrasound, and how to implement the principle of ALARA.

Display Resolution and Measurement Accuracy

For any transducer capable of exceeding a mechanical or thermal index value of 1.0, the ultrasound imaging system displays indices starting from 0.4. The resolution of the display is 0.1 for all displayed values of MI. For all TI values, the resolution of the display is 0.2.

It is important to note that displayed indices are obtained through measurement, and are subject to measurement errors. Specific measurement uncertainties for acoustic power, pressure, and center frequency are 4.2%, 9.4%, and 2.0% respectively. Measurement precision for ultrasonic power, peak rarefactional pressure, and center frequency from a standard test transducer/driver combination is 6.1%, 8.1%, and 0.2% respectively. The reported values assume 90% population (*P*) at 90% confidence level (γ).Definitions for these parameters can be found in the 1998 AIUM/NEMA document entitled *Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment* – Revision 1 (also known as the Output Display Standard).

Default Displayed MI and TI Values by Transducer

(Per transducer/mode that exceeds default MI or TI value of 1.0)

	Mode			
	B		M	
Transducer	MI	TI	MI	TI
7.5L75S	----	----	----	----
L10-5	----	----	----	----
C4-2	----	1.2	----	----
C5-2	----	----	----	----
C8-5	----	1.0	----	----
EC9-4	----	----	----	----
EV9-4	----	----	----	----
Endo-P II	----	----	----	----
Endo-V II	----	----	----	----

Transducers and Intended Applications

Only the following transducers from Siemens are compatible with the SONOLINE G20 ultrasound imaging system:

TRANSDUCER NAME	OPERATING FREQUENCY	MODES OF OPERATION	INTENDED APPLICATIONS
CURVED AND LINEAR ARRAY TRANSDUCERS			
C4-2	2 – 5 MHz	B, M	Abdomen, Renal, Cardiac
C5-2	2 – 5 MHz	B, M	Abdomen, Renal, Obstetrics, Gynecology
C8-5	5 – 8 MHz	B, M	Pediatric Abdomen, Neonatal Cephalic
EC9-4	4 – 9 MHz	B, M	Prostate, Early Obstetrics, Gynecology
EV9-4	4 – 8 MHz	B, M	Early Obstetrics, Gynecology
7.5L75S	5 – 10 MHz	B, M	Breast, Thyroid, Orthopedics, Musculoskeletal
L10-5	5 – 10 MHz	B, M	Thyroid, Breast, Testis, Orthopedics, Musculoskeletal
MECHANICAL SECTOR TRANSDUCERS			
Endo-V II	5.0 – 7.5 MHz	B, M	Early Obstetrics, Gynecology
Endo-P II	5.0 – 7.5 MHz	B, M	Endorectal, Prostate

EMC Note: Operating the transducer in close proximity to sources of strong electromagnetic fields, such as radio transmitter stations or similar installations may lead to temporary degradation or interference visible on the monitor screen. A lightening of image background may be noticed while visualizing hypoechoic structures, or color spectral interference, or jitter, or horizontal lines in the image screen may occur. The transducer and the system have been designed and tested to withstand such interference and will not be permanently damaged. Refer to the Electromagnetic Emissions and Immunity Guidence and Manufacturer’s Declaration.

IEC 61157 Acoustic Output Reporting

Acoustic output information for the SONOLINE G20 ultrasound imaging system. Linear Array Transducer. Type: **7.5L75S**

Manufacturer: Siemens Medical Solutions USA, Inc., Ultrasound Group

Parameter	**Mode**	**Bp**	**Bi**	**Mp**	**Mi**
p_{-} (MPa)		2.9	2.9	2.9	2.9
I_{spta} (mW/cm^2)		170	200	230	260
System settings		6.0 MHz	6.0 MHz	6.0 MHz	6.0 MHz
Focus in mm		25	30	25	30
Output in dB		0	0	0	0
l_p (mm)		22	25	22	25
W_{pb6} (II) (mm)		1.1	1.2	1.1	1.2
(⊥) (mm)		1.2	1.1	1.2	1.1
prr (kHz)		7.8	7.8	1.0	1.0
srr (Hz)		252	252	-	-
Output beam dimensions (mm)		6.0 x 8.3	7.2 x 8.3	6.0 x 8.3	7.2 x 8.3
f_{awf} (MHz)		6.1	6.1	6.1	6.1
APF [a] (%)		n/a	n/a	n/a	n/a
AIF [b] (%)		n/a	n/a	n/a	n/a
Maximum power (mW)		42	47	3.6	4.0
I_{ob} (mW/cm^2)		85	79	7.3	6.7
Power-up mode		B	B	B	B
Initialization mode		n/a	n/a	n/a	n/a
Acoustic output freeze		Yes	Yes	Yes	Yes
l_{tt} (mm)		n/a	n/a	n/a	n/a
l_{ts} (mm)		contact	contact	contact	contact
Inclusive modes		-	-	B+M	B+M

a Acoustic power-up fraction
b Acoustic initialization fraction

Acoustic output information for the SONOLINE G20 ultrasound imaging system. Linear Array Transducer. Type: **L10-5**

Manufacturer: Siemens Medical Solutions USA, Inc., Ultrasound Group

Parameter	**Mode**	**Bp**	**Bi**	**Mp**	**Mi**
p_{-} (MPa)		3.3	3.0	3.3	3.0
I_{spta} (mW/cm^2)		190	260	170	210
System settings		7.5 MHz	6.5 MHz	7.5 MHz	6.5 MHz
Focus in mm		21	21	21	21
Output in dB		0	0	0	0
l_p (mm)		17	17	17	17
W_{pb6} (II) (mm)		1.2	1.3	1.2	1.3
(⊥) (mm)		1.2	1.4	1.2	1.4
prr (kHz)		7.8	7.8	1.0	1.0
srr (Hz)		252	252	-	-
Output beam dimensions (mm)		4.6 x 5.0	4.6 x 5.0	4.6 x 5.0	4.6 x 5.0
f_{awf} (MHz)		6.8	6.3	6.8	6.3
APF [a] (%)		n/a	n/a	n/a	n/a
AIF [b] (%)		n/a	n/a	n/a	n/a
Maximum power (mW)		33	53	2.8	4.5
I_{ob} (mW/cm^2)		140	230	12	20
Power-up mode		B	B	B	B
Initialization mode		n/a	n/a	n/a	n/a
Acoustic output freeze		Yes	Yes	Yes	Yes
l_{tt} (mm)		n/a	n/a	n/a	n/a
l_{ts} (mm)		contact	contact	contact	contact
Inclusive modes		-	-	B+M	B+M

a Acoustic power-up fraction
b Acoustic initialization fraction

Acoustic output information is presented according to the recommendations of the International Electrotechnical Commission (IEC) as expressed in IEC 61157.

Acoustic output information for the SONOLINE G20 ultrasound imaging system. Convex Array Transducer. Type: **C4-2**

Manufacturer: Siemens Medical Solutions USA, Inc., Ultrasound Group

Parameter	**Mode**	**Bp**	**Bi**	**Mp**	**Mi**
$p_{\_}$ (MPa)		1.8	1.5	1.8	1.5
I_{spta} (mW/cm^2)		150	250	79	160
System settings		3.5 MHz	5.6(2.8) MHz	3.5 MHz	5.6(2.8) MHz
Focus in mm		120	102	120	102
Output in dB		0	0	0	0
l_p (mm)		56	52	56	52
W_{pb6} (II) (mm)		6.7	5.6	6.7	5.6
(⊥) (mm)		1.9	1.9	1.9	1.9
prr (kHz)		7.8	7.8	1.0	1.0
srr (Hz)		250	250	-	-
Output beam dimensions (mm)		12 x 14	11 x 14	12 x 14	11 x 14
f_{awf} (MHz)		3.3	2.9	3.3	2.9
APF [a] (%)		n/a	n/a	n/a	n/a
AIF [b] (%)		n/a	n/a	n/a	n/a
Maximum power (mW)		140	230	12	20
I_{ob} (mW/cm^2)		81	150	6.9	13
Power-up mode		B	B	B	B
Initialization mode		n/a	n/a	n/a	n/a
Acoustic output freeze		Yes	Yes	Yes	Yes
l_{tt} (mm)		n/a	n/a	n/a	n/a
l_{ts} (mm)		contact	contact	contact	contact
Inclusive modes		-	-	B+M	B+M
a Acoustic power-up fraction					
b Acoustic initialization fraction					

Acoustic output information for the SONOLINE G20 ultrasound imaging system. Convex Array Transducer. Type: **C5-2**

Manufacturer: Siemens Medical Solutions USA, Inc., Ultrasound Group

Parameter	**Mode**	**Bp**	**Bi**	**Mp**	**Mi**
$p_{\_}$ (MPa)		2.6	1.7	2.6	1.7
I_{spta} (mW/cm^2)		160	210	150	180
System settings		3.5 MHz	5.6(2.8) MHz	3.5 MHz	5.6(2.8) MHz
Focus in mm		73	61	73	61
Output in dB		0	0	0	0
l_p (mm)		53	44	53	44
W_{pb6} (II) (mm)		2.9	3.0	2.9	3.0
(⊥) (mm)		2.9	4.2	2.9	4.2
prr (kHz)		7.8	7.8	1.0	1.0
srr (Hz)		252	252	-	-
Output beam dimensions (mm)		15 x 12	11 x 12	15 x 12	11 x 12
f_{awf} (MHz)		3.7	3.0	3.7	3.0
APF [a] (%)		n/a	n/a	n/a	n/a
AIF [b] (%)		n/a	n/a	n/a	n/a
Maximum power (mW)		170	310	14	26
I_{ob} (mW/cm^2)		120	250	9.8	21
Power-up mode		B	B	B	B
Initialization mode		n/a	n/a	n/a	n/a
Acoustic output freeze		Yes	Yes	Yes	Yes
l_{tt} (mm)		n/a	n/a	n/a	n/a
l_{ts} (mm)		contact	contact	contact	contact
Inclusive modes		-	-	B+M	B+M
a Acoustic power-up fraction					
b Acoustic initialization fraction					

Acoustic output information is presented according to the recommendations of the International Electrotechnical Commission (IEC) as expressed in IEC 61157.

Acoustic output information for the SONOLINE G20 ultrasound imaging system. Convex Array Transducer. Type: **C8-5**

Manufacturer: Siemens Medical Solutions USA, Inc., Ultrasound Group

Parameter	**Mode**	**Bp**	**Bi**	**Mp**	**Mi**
$p\_$ (MPa)		2.3	2.3	2.3	2.3
I_{spta} (mW/cm^2)		110	110	93	93
System settings		6.5 MHz	6.5 MHz	6.5 MHz	6.5 MHz
Focus in mm		27	27	27	27
Output in dB		0	0	0	0
l_p (mm)		17	17	17	17
W_{pb6} (II) (mm)		1.6	1.6	1.6	1.6
(⊥) (mm)		1.0	1.0	1.0	1.0
prr (kHz)		7.8	7.8	1.0	1.0
srr (Hz)		250	250	-	-
Output beam dimensions (mm)		4.0 x 5.0	4.0 x 5.0	4.0 x 5.0	4.0 x 5.0
f_{awf} (MHz)		6.4	6.4	6.4	6.4
APF [a] (%)		n/a	n/a	n/a	n/a
AIF [b] (%)		n/a	n/a	n/a	n/a
Maximum power (mW)		21	21	1.8	1.8
I_{ob} (mW/cm^2)		100	100	8.7	8.7
Power-up mode		B	B	B	B
Initialization mode		n/a	n/a	n/a	n/a
Acoustic output freeze		Yes	Yes	Yes	Yes
l_{tt} (mm)		n/a	n/a	n/a	n/a
l_{ts} (mm)		contact	contact	contact	contact
Inclusive modes		-	-	B+M	B+M

a Acoustic power-up fraction
b Acoustic initialization fraction

Acoustic output information for the SONOLINE G20 ultrasound imaging system. Convex Array Transducer. Type: **EC9-4**

Manufacturer: Siemens Medical Solutions USA, Inc., Ultrasound Group

Parameter	**Mode**	**Bp**	**Bi**	**Mp**	**Mi**
$p\_$ (MPa)		3.0	2.8	3.0	2.8
I_{spta} (mW/cm^2)		200	220	190	210
System settings		4.2 MHz	4.2 MHz	4.2 MHz	4.2 MHz
Focus in mm		21	26	21	26
Output in dB		0	0	0	0
l_p (mm)		18	20	18	20
W_{pb6} (II) (mm)		1.8	2.0	1.8	2.0
(⊥) (mm)		2.1	1.7	2.1	1.7
prr (kHz)		7.8	7.8	1.0	1.0
srr (Hz)		252	252	-	-
Output beam dimensions (mm)		5.3 x 5.0	5.7 x 5.0	5.3 x 5.0	5.7 x 5.0
f_{awf} (MHz)		4.8	4.7	4.8	4.7
APF [a] (%)		n/a	n/a	n/a	n/a
AIF [b] (%)		n/a	n/a	n/a	n/a
Maximum power (mW)		98	94	8.4	8.1
I_{ob} (mW/cm^2)		370	330	32	28
Power-up mode		B	B	B	B
Initialization mode		n/a	n/a	n/a	n/a
Acoustic output freeze		Yes	Yes	Yes	Yes
l_{tt} (mm)		n/a	n/a	n/a	n/a
l_{ts} (mm)		contact	contact	contact	contact
Inclusive modes		-	-	B+M	B+M

a Acoustic power-up fraction
b Acoustic initialization fraction

Acoustic output information is presented according to the recommendations of the International Electrotechnical Commission (IEC) as expressed in IEC 61157.

Acoustic output information for the SONOLINE G20 ultrasound imaging system. Convex Array Transducer. Type: **EV9-4**

Manufacturer: Siemens Medical Solutions USA, Inc., Ultrasound Group

Parameter	**Mode**	**Bp**	**Bi**	**Mp**	**Mi**
$p\_$ (MPa)		2.9	2.7	2.9	2.7
I_{spta} (mW/cm^2)		120	170	140	220
System settings		6.5 MHz	4.2 MHz	6.5 MHz	4.2 MHz
Focus in mm		19	19	19	19
Output in dB		0	0	0	0
l_p (mm)		18	17	18	17
W_{pb6} (II) (mm)		1.3	1.3	1.3	1.3
(⊥) (mm)		1.5	1.7	1.5	1.7
prr (kHz)		7.8	7.8	1.0	1.0
srr (Hz)		252	252	-	-
Output beam dimensions (mm)		4.9 x 6.0	4.9 x 6.0	4.9 x 6.0	4.9 x 6.0
f_{awf} (MHz)		5.8	5.5	5.8	5.5
APF [a] (%)		n/a	n/a	n/a	n/a
AIF [b] (%)		n/a	n/a	n/a	n/a
Maximum power (mW)		39	68	3.3	5.8
I_{ob} (mW/cm^2)		130	230	11	20
Power-up mode		B	B	B	B
Initialization mode		n/a	n/a	n/a	n/a
Acoustic output freeze		Yes	Yes	Yes	Yes
l_{tt} (mm)		n/a	n/a	n/a	n/a
l_{ts} (mm)		contact	contact	contact	contact
Inclusive modes		-	-	B+M	B+M
a Acoustic power-up fraction					
b Acoustic initialization fraction					

Acoustic output information for the SONOLINE G20 ultrasound imaging system. Mechanical Sector Transducer. Type: **Endo-V II**

Manufacturer: Siemens Medical Solutions USA, Inc., Ultrasound Group

Parameter	**Mode**	**Bp**	**Bi**	**Mp**	**Mi**
$p\_$ (MPa)		1.4	1.4	1.4	1.4
I_{spta} (mW/cm^2)		10	10	25	25
System settings		5.0 MHz	5.0 MHz	5.0 MHz	5.0 MHz
Focus in mm		30	30	30	30
Output in dB		0	0	0	0
l_p (mm)		25	25	25	25
W_{pb6} (II) (mm)		1.6	1.6	1.6	1.6
(⊥) (mm)		1.7	1.7	1.7	1.7
prr (kHz)		6.2	6.2	0.25	0.25
srr (Hz)		17	17	-	-
Output beam dimensions (mm)		8.0Φ	8.0Φ	8.0Φ	8.0Φ
f_{awf} (MHz)		5.4	5.4	5.4	5.4
APF [a] (%)		n/a	n/a	n/a	n/a
AIF [b] (%)		n/a	n/a	n/a	n/a
Maximum power (mW)		30	30	0.80	0.80
I_{ob} (mW/cm^2)		59	59	1.6	1.6
Power-up mode		B	B	B	B
Initialization mode		n/a	n/a	n/a	n/a
Acoustic output freeze		Yes	Yes	Yes	Yes
l_{tt} (mm)		n/a	n/a	n/a	n/a
l_{ts} (mm)		contact	contact	contact	contact
Inclusive modes		-	-	B+M	B+M
a Acoustic power-up fraction					
b Acoustic initialization fraction					

Acoustic output information is presented according to the recommendations of the International Electrotechnical Commission (IEC) as expressed in IEC 61157.

Acoustic output information for the SONOLINE G20 ultrasound imaging system. Mechanical Sector Transducer. Type: **Endo-P II**

Manufacturer: Siemens Medical Solutions USA, Inc., Ultrasound Group

Parameter	**Mode**	**Bp**	**Bi**	**Mp**	**Mi**
$p_{\_}$ (MPa)		1.4	1.3	1.4	1.3
I_{spta} (mW/cm^2)		8.2	8.8	21	22
System settings		5.0 MHz	7.5 MHz	5.0 MHz	7.5 MHz
Focus in mm		35	20	35	20
Output in dB		0	0	0	0
l_p (mm)		24	19	24	19
W_{pb6} (II) (mm)		1.7	1.5	1.7	1.5
(⊥) (mm)		1.7	1.4	1.7	1.4
prr (kHz)		6.8	6.8	0.25	0.25
srr (Hz)		17	17	-	-
Output beam dimensions (mm)		7.0Φ	7.0Φ	7.0Φ	7.0Φ
f_{awf} (MHz)		5.2	5.9	5.2	5.9
APF [a] (%)		n/a	n/a	n/a	n/a
AIF [b] (%)		n/a	n/a	n/a	n/a
Maximum power (mW)		29	22	0.71	0.55
I_{ob} (mW/cm^2)		76	58	1.9	1.4
Power-up mode		B	B	B	B
Initialization mode		n/a	n/a	n/a	n/a
Acoustic output freeze		Yes	Yes	Yes	Yes
l_{tt} (mm)		n/a	n/a	n/a	n/a
l_{ts} (mm)		contact	contact	contact	contact
Inclusive modes		-	-	B+M	B+M

a Acoustic power-up fraction
b Acoustic initialization fraction

Acoustic output information is presented according to the recommendations of the International Electrotechnical Commission (IEC) as expressed in IEC 61157.

Track 3, FDA 510(k) Acoustic Output Reporting

Data presented in Track 3 format represents the average MI/TI values for five transducers measured under worst-case acoustic output conditions. The on-screen MI/TI values are based on measurements on one transducer under worst case acoutstic output conditions - rounded up to the nearest display increment. It is possible that the values displayed on screen may exceed the MI/TI values presented in the Track 3 format.

System Reference	
IEC 61157	1-6

Summary Table for Acoustic Output

An "**X**" indicates that either the MI index or TI indices is greater than 1.0 for each transducer/mode. A Track 3 format acoustic output table is supplied for each transducer/mode combination marked with an "**X**".

Operating Mode	Transducer Model								
	75L75S	L10-5	C5-2	EC9-4	EV9-4	C4-2	C8-5	Endo-P II	Endo-V II
B-mode (2D)		**X**		**X**		**X**	**X**		
M-mode		**X**		**X**		**X**	**X**		

The following rules apply to the summary table:

B-mode (2D)	No other mode active. Only MI (when larger than 1.0) is reported for this mode.
M-mode	Includes simultaneous B-mode.
PW-Doppler	In duplex modes, the largest displayed TIS (scanned or non-scanned) is reported if it is larger than 1.0.
Color Flow or Power	Includes simultaneous color flow M-mode, B-mode, and Doppler. In combined modes, the largest displayed TIS (scanned or non-scanned) is reported if it is larger than 1.0.
Other	The output is reported as a separate mode if the largest formulation of TIS, TIB, or TIC (if an intended use) is greater than the corresponding value reported for all constituent mode. TIC is reported if the transducer is intended for transcranial or neonatal cephalic use.

Definitions

Symbol	Definition	Units
MI	Mechanical Index	N/A
TIS Scan	Soft Tissue Thermal Index in autoscanning mode	N/A
TIS Non-scan	Soft Tissue Thermal Index in non-autoscanning mode	N/A
TIB	Bone Thermal Index	N/A
TIC	Cranial Thermal Index	N/A
Aaprt	Area of the active aperture	cm^2
$P_{r.3}$	Derated peak rarefactional pressure	MPa
W_o	Ultrasonic power, except for TIS Scan, in which case it is the ultrasonic power passing through a one centimeter window.	mW
$W_{.3}(Z_1)$	Derated ultrasonic power at axial distance Z_1	mW
$I_{TA.3}(Z_1)$	Derated spatial-peak, temporal-average intensity at axial distance Z_1.	mW/cm^2
Z_1	Axial distance corresponding to the location of the max [$W_{.3}(Z_1)$, $I_{TA.3}(Z)$ x 1 cm^2)], where Z > Z_{bp}.	cm^2
Z_{bp}	1.69 $(A_{aprt})^{1/2}$.	cm
Z_{sp}	For MI: axial distance at which $P_{r.3}$ is measured For TIB: axial distance at which TIB is a maximum (i.e., $Z_{sp} = Z_{B.3}$)	cm
d_{eq} (Z_{sp})	Equivalent beam diameter as a function of axial distance, and is equal to where ITA (Z) is the temporal-average intensity as a function of Z	cm
f_c	Center frequency	MHz
Dim. of A_{aprt}	Active aperture dimensions for the azimuth and elevational planes	cm
PD	Pulse duration	µs
PRF	Pulse repetition frequency	Hz
Pr @ PII max	Peak rarefactional pressure at the point where the free-field, spatial-peak pulse intensity integral is a maximum	MPa
d eq@ PII max	Equivalent beam diameter at the point where the free-field, spatial-peak pulse intensity integral is a maximum	cm
FL	Focal Length, or azimuthal and elevational lengths, if different	cm
$I_{pa.3}$ @ MI max	Derated pulse-average intensity at the point of global maximum	W/cm^2

Acoustic Output Reporting Table – Track 3, FDA 510(k)
(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **L10-5** Operating mode: **B-mode**

Associated Acoustic Parameters

Index Label		MI	TIS			TIB	TIC
			Scan	Non-scan		Non-scan	
				$A_{aprt} \le 1$	$A_{aprt} > 1$		
Maximum Value	---	1.0	(a)	(a)	(a)	(a)	(a)
Pr.3	(MPa)	2.5					
Wo	(mW)		#	#		#	#
min of [W.3(Z1), ITA.3(Z1)]	(mW)				#		
Z1	(cm)				#		
Zbp	(cm)				#		
Zsp	(cm)	1.3				#	
deq (Zsp)	(cm)					#	
fc	(MHz)	6.4	#	#	#	#	#
Dim. of Aaprt	X (cm)		#	#	#	#	#
	Y (cm)		#	#	#	#	#

Other information

PD	(µsec)	0.26					
PRF	(Hz)	7800					
Pr @ PII max	(MPa)	2.9					
d eq@ PII max	(cm)					#	#
Focal Length	FLx (cm)		#	#	#		#
	FLy (cm)		#	#	#		#
I pa.3 @ MI max	(W/cm2)	360					

Operator Control

TX-Level (dB)	0					
Focus(mm)	18					
PRF (Hz)						

Acoustic Output Reporting Table – Track 3, FDA 510(k)
(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **L10-5** Operating mode: **M-mode**

Associated Acoustic Parameters

Index Label		MI	TIS			TIB	TIC
			Scan	Non-scan		Non-scan	
				$A_{aprt} \le 1$	$A_{aprt} > 1$		
Maximum Value	---	1.0	0.49	0.06	---	0.13	0.38
Pr.3	(MPa)	2.5					
W_o	(mW)		17	1.7		1.9	17
min of $[W_3(Z_1), I_{TA.3}(Z_1)]$	(mW)				#		
Z_1	(cm)				#		
Z_{bp}	(cm)				#		
Z_{sp}	(cm)	1.3				1.4	
$d_{eq}(Z_{sp})$	(cm)					0.18	
f_c	(MHz)	6.4	6.2	7.0	#	6.2	6.2
Dim. of A_{aprt}	X (cm)		1.6	1.6	#	1.6	1.6
	Y (cm)		0.50	0.50	#	0.50	0.50

Other information

PD	(µsec)	0.26					
PRF	(Hz)	1000					
Pr @ PII max	(MPa)	2.9					
d eq@ PII max	(cm)					0.17	0.50
Focal Length	FLx (cm)		8.3	8.3	#		8.3
	FLy (cm)		2.0	2.0	#		2.0
I pa.3 @ MI max	(W/cm2)	360					

Operator Control

TX-Level (dB)	0	0	0		0	0
Focus(mm)	18	83	83		83	83
PRF (Hz)						

a	This Index is not relevant to this operating mode.
b	This transducer is not intended for transcranial or neonatal cephalic uses.
c	This formulation for TIS is less than that for an alternate formulation in this mode.
#	No data is provided for this operation condition since the maximum index value is not reported for the reason listed.

Acoustic Output Reporting Table – Track 3, FDA 510(k)

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **EC9-4** Operating mode: **B-mode**

Associated Acoustic Parameters

Index Label		MI	TIS			TIB	TIC
			Scan	Non-scan		Non-scan	
				$A_{aprt} \le 1$	$A_{aprt} > 1$		
Maximum Value	---	1.0	(a)	(a)	(a)	(a)	(a)
Pr.3	(MPa)	2.3					
Wo	(mW)		#	#		#	#
min of [W.3(Z1), ITA.3(Z1)]	(mW)				#		
Z1	(cm)				#		
Zbp	(cm)				#		
Zsp	(cm)	1.8				#	
deq (Zsp)	(cm)					#	
fc	(MHz)	4.8	#	#	#	#	#
Dim. of Aaprt	X (cm)		#	#	#	#	#
	Y (cm)		#	#	#	#	#

Other information

PD	(µsec)	0.28					
PRF	(Hz)	7800					
Pr @ PII max	(MPa)	3.0					
d eq@ PII max	(cm)					#	#
Focal Length	FLx (cm)		#	#	#		#
	FLy (cm)		#	#	#		#
I pa.3 @ MI max	(W/cm2)	370					

Operator Control

TX-Level (dB)	0					
Focus(mm)	21					
PRF (Hz)						

Acoustic Output Reporting Table – Track 3, FDA 510(k)

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **EC9-4** Operating mode: **M-mode**

Associated Acoustic Parameters

Index Label		MI	TIS			TIB	TIC
			Scan	Non-scan		Non-scan	
				$A_{aprt} \le 1$	$A_{aprt} > 1$		
Maximum Value	---	1.0	0.34	0.03	---	0.12	0.19
Pr.3	(MPa)	2.3					
W_o	(mW)		10	1.3		1.2	12
min of $[W_3(Z_1), I_{TA.3}(Z_1)]$	(mW)				#		
Z_1	(cm)				#		
Z_{bp}	(cm)				#		
Z_{sp}	(cm)	1.8				2.0	
$d_{eq}(Z_{sp})$	(cm)					0.12	
f_c	(MHz)	4.8	4.6	5.0	#	4.6	4.6
Dim. of A_{aprt}	X (cm)		1.0	1.0	#	1.0	1.0
	Y (cm)		0.50	0.50	#	0.50	0.50

Other information

PD	(µsec)	0.28					
PRF	(Hz)	1000					
Pr @ PII max	(MPa)	3.0					
d eq@ PII max	(cm)					0.13	0.45
Focal Length	FLx (cm)		5.3	10	#		5.3
	FLy (cm)		2.2	2.2	#		2.2
I pa.3 @ MI max	(W/cm2)	370					

Operator Control

TX-Level (dB)	0	0	0		0	0
Focus(mm)	21	53	102		53	53
PRF (Hz)						

a	This Index is not relevant to this operating mode.
b	This transducer is not intended for transcranial or neonatal cephalic uses.
c	This formulation for TIS is less than that for an alternate formulation in this mode.
#	No data is provided for this operation condition since the maximum index value is not reported for the reason listed.

Acoustic Output Reporting Table – Track 3, FDA 510(k)

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **C4-2** Operating mode: **B-mode**

Associated Acoustic Parameters

Index Label		MI	TIS			TIB	TIC
			Scan	Non-scan		Non-scan	
				$A_{aprt} \le 1$	$A_{aprt} > 1$		
Maximum Value	---	0.57	(a)	(a)	(a)	(a)	(a)
Pr.3	(MPa)	1.1					
Wo	(mW)		#	#		#	#
min of [W.3(Z1), ITA.3(Z1)]	(mW)				#		
Z1	(cm)				#		
Zbp	(cm)				#		
Zsp	(cm)	5.2				#	
deq (Zsp)	(cm)					#	
fc	(MHz)	3.4	#	#	#	#	#
Dim. of Aaprt	X (cm)		#	#	#	#	#
	Y (cm)		#	#	#	#	#

Other information

PD	(µsec)	0.21					
PRF	(Hz)	7800					
Pr @ PII max	(MPa)	1.7					
d eq@ PII max	(cm)					#	#
Focal Length	FLx (cm)		#	#	#		#
	FLy (cm)		#	#	#		#
I pa.3 @ MI max	(W/cm2)	160					

Operator Control

TX-Level	(dB)	0					
Focus(mm)		102					
PRF	(Hz)						

Acoustic Output Reporting Table – Track 3, FDA 510(k)

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **C4-2** Operating mode: **M-mode**

Associated Acoustic Parameters

Index Label		MI	TIS			TIB	TIC
			Scan	Non-scan		Non-scan	
				$A_{aprt} \le 1$	$A_{aprt} > 1$		
Maximum Value	---	0.57	1.5	---	0.11	0.28	1.6
Pr.3	(MPa)	1.1					
W_o	(mW)		110	#		8.7	110
min of $[W_3(Z_1), I_{TA.3}(Z_1)]$	(mW)				4.0		
Z_1	(cm)				2.3		
Z_{bp}	(cm)				2.3		
Z_{sp}	(cm)	5.2				4.9	
$d_{eq}(Z_{sp})$	(cm)					0.26	
f_c	(MHz)	3.4	2.8	#	2.8	3.0	2.8
Dim. of A_{aprt}	X (cm)		1.3	#	1.3	1.0	1.3
	Y (cm)		1.4	#	1.4	1.4	1.4

Other information

PD	(µsec)	0.21					
PRF	(Hz)	1000					
Pr @ PII max	(MPa)	1.7					
d eq@ PII max	(cm)					0.27	1.2
Focal Length	FLx (cm)		14	#	14		14
	FLy (cm)		6.0	#	6.0		6.0
I pa.3 @ MI max	(W/cm2)	160					

Operator Control

TX-Level	(dB)	0	0		0	0	0
Focus(mm)		102	141		141	86	141
PRF	(Hz)						

a	This Index is not relevant to this operating mode.
b	This transducer is not intended for transcranial or neonatal cephalic uses.
c	This formulation for TIS is less than that for an alternate formulation in this mode.
#	No data is provided for this operation condition since the maximum index value is not reported for the reason listed.

Acoustic Output Reporting Table – Track 3, FDA 510(k)

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **C8-5** Operating mode: **B-mode**

Associated Acoustic Parameters

Index Label		MI	TIS			TIB	TIC
			Scan	Non-scan		Non-scan	
				$A_{aprt} \leq 1$	$A_{aprt} > 1$		
Maximum Value	---	0.70	(a)	(a)	(a)	(a)	(a)
Pr.3	(MPa)	1.8					
Wo	(mW)		#	#		#	#
min of [W.3(Z1), ITA.3(Z1)]	(mW)				#		
Z1	(cm)				#		
Zbp	(cm)				#		
Zsp	(cm)	1.4				#	
deq (Zsp)	(cm)					#	
fc	(MHz)	6.4	#	#	#	#	#
Dim. of Aaprt	X (cm)		#	#	#	#	#
	Y (cm)		#	#	#	#	#

Other information

PD	(µsec)	0.14					
PRF	(Hz)	7800					
Pr @ PII max	(MPa)	2.0					
d eq@ PII max	(cm)					#	#
Focal Length	FLx (cm)		#	#	#		#
	FLy (cm)		#	#	#		#
I pa.3 @ MI max	(W/cm2)	380					

Operator Control

TX-Level (dB)	0					
Focus(mm)	27					
PRF (Hz)						

Acoustic Output Reporting Table – Track 3, FDA 510(k)

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **C8-5** Operating mode: **M-mode**

Associated Acoustic Parameters

Index Label		MI	TIS			TIB	TIC
			Scan	Non-scan		Non-scan	
				$A_{aprt} \leq 1$	$A_{aprt} > 1$		
Maximum Value	---	0.70	1.3	0.09	---	0.11	0.74
Pr.3	(MPa)	1.8					
W_o	(mW)		25	2.9		2.1	25
min of $[W_3(Z_1), I_{TA.3}(Z_1)]$	(mW)				#		
Z_1	(cm)				#		
Z_{bp}	(cm)				#		
Z_{sp}	(cm)	1.4				1.5	
$d_{eq}(Z_{sp})$	(cm)					0.24	
f_c	(MHz)	6.4	6.5	6.5	#	5.7	6.5
Dim. of A_{aprt}	X (cm)		0.88	0.88	#	0.88	0.88
	Y (cm)		0.50	0.50	#	0.50	0.50

Other information

PD	(µsec)	0.14					
PRF	(Hz)	1000					
Pr @ PII max	(MPa)	2.0					
d eq@ PII max	(cm)					0.24	0.92
Focal Length	FLx (cm)		7.8	7.8	#		7.8
	FLy (cm)		1.9	1.9	#		1.9
I pa.3 @ MI max	(W/cm2)	380					

Operator Control

TX-Level (dB)	0	0	0		0
Focus(mm)	27	78	78		78
PRF (Hz)					

a	This Index is not relevant to this operating mode.
b	This transducer is not intended for transcranial or neonatal cephalic uses.
c	This formulation for TIS is less than that for an alternate formulation in this mode.
#	No data is provided for this operation condition since the maximum index value is not reported for the reason listed.

2 Accessories and Options

Accessories and Options

Note: Not all features and options described in this publication are available to all users. Please check with your Siemens representative to determine the current availaibility of features and options.

The only Siemens-authorized accessories and options for the SONOLINE G20 ultrasound imaging system are described in this chapter.

⚠ **WARNING:** Accessory equipment connected to the analog and digital interfaces must be certified according to the respective EN and IEC standards (e.g., EN 60950 and IEC 60950 for data processing equipment and EN 60601-1 and IEC 60601-1 for medical equipment). Furthermore, all configurations shall comply with the system standard EN 60601-1-1 and IEC 60601-1-1. Anyone who connects additional equipment to the signal input or signal output ports configures a medical system and is therefore responsible that the system complies with the requirements of the system standard EN 60601-1-1 and IEC 60601-1-1. Siemens can only guarantee the performance and safety of the devices listed in the Accessories and Options chapter. If in doubt, consult Siemens service department or your local Siemens representative.

Note: To ensure compliance with the Medical Device Directive, use only the devices listed in this chapter with your ultrasound imaging system.

SONOLINE G20

Includes system software (CD), preset data disk (CD), transducer cups, power cord(s).

System Configurations

- Two standard array transducer ports[1]
- Two standard array transducer ports and one mechanical sector transducer port[2]
- Two standard array transducer ports and one parking port for linear and curved array transducers

Language-Specific Operating System

Includes an overlay for the control panel and system user and reference manuals.

- English Language Operating System
- German Language Operating System
- French Language Operating System
- Spanish Language Operating System
- Italian Language Operating System

Options

- THI™ Tissue Harmonic Imaging Option
- TGO™ Tissue Grayscale Optimization Option
- DICOM 3.0 Connectivity Option
- DICOM Modality Worklist Option (requires the DICOM Connectivity Option)
- DICOM MPPS Option[2] (requires the DICOM Connectivity Option and DICOM Modality Worklist Option)
- Dual-pedal footswitch
- Monitor filter
- Clip Store[2]
- Brachytherapy Template Software[2] (requires systems configured with a mechanical sector transducer port and the use of the Endo-P II transducer)

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[1] No longer available for purchase
[2] Requires software version 2.0 or higher

Transducers, Linear Array

- L10-5
- 7.5L75S

Transducers, Curved Array

- C4-2[1]
- C5-2
- C8-5[1]
- EV9-4
- EC9-4

Transducers, Mechanical Sector

- Endo-P II[1]
- Endo-V II[1]

Transducer Accessories

- Transducer Sheaths:
  - Non-sterile, EC9-4, Endo-V II[1]
  - Sterile, EV9-4, EC9-4, Endo-V II[1]
- Biopsy Protective Sleeves, C5-2, L10-5, 7.5L75S, C4-2[1], C8-5[1]
- Standoff Gel Pad, Disposable, L10-5, 7.5L75S
- Universal Needle Guide Kit, Stainless Steel, C5-2, L10-5, C4-2[1], C8-5[1]
- Needle Guide Bracket Kit, 7.5L75S
  - Needle Guide, 20G/0.9mm, 7.5L75S
  - Needle Guide, 18G/1.3mm, 7.5L75S
  - Needle Guide, 15G/1.8mm, 7.5L75S
  - Needle Guide, 2.3mm, 7.5L75S
  - Needle Guide, 2.5mm, 7.5L75S
- Needle Guide Bracket Kit, Disposable, EC9-4
- Needle Guide Bracket Kit, Stainless Steel, EC9-4
- Needle Guide Bracket Kit, EV9-4
- Needle Guide Bracket Kit, Endo-V II[1]
  - Needle Guide, 18G/1.2mm, Endo-V II
  - Needle Guide, 16G/1.6mm, Endo-V II
- Needle Guide Bracket Kit, Endo-P II[1]
  - Needle Guide, 90, Endo-P II
  - Needle Guide, 120, Endo-P II
  - Needle Guide, C120, Endo-P II

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[1] Requires software version 2.0 or higher

PAL Documentation Devices

- B&W Video Printer, P93-W, Mitsubishi
- VCR, S-VHS, HS-MD3000, PAL, Mitsubishi

NTSC Documentation Devices

- B&W Video Printer, P93-W, Mitsubishi
- VCR, S-VHS, HS-MD3000, NTSC, Mitsubishi

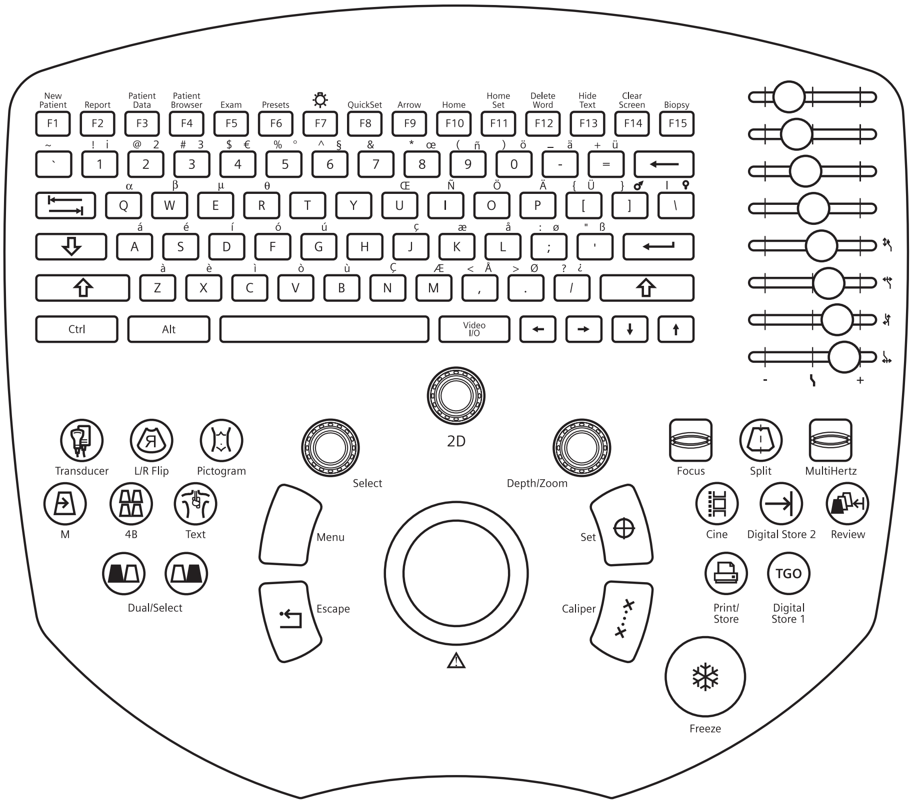
Consumables

- Contact Scan Gel, 5 liter
- Contact Scan Gel, 0.25 liter
- Contact Scan Gel, Sterile Packets
- Paper, Black and White Video Printer
- Cleaning Sheets, Black and White Video Printer
- CD-R (10)

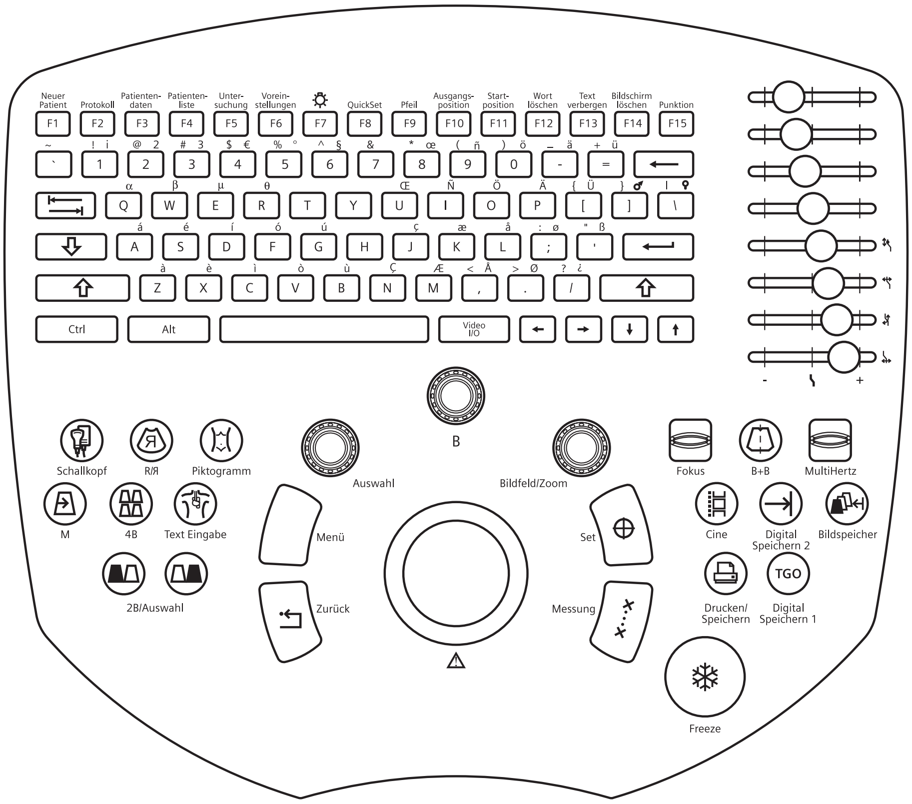
Control Panel Overlays

The control panel on the ultrasound imaging system has overlays available in English, German, French, Spanish, and Italian.

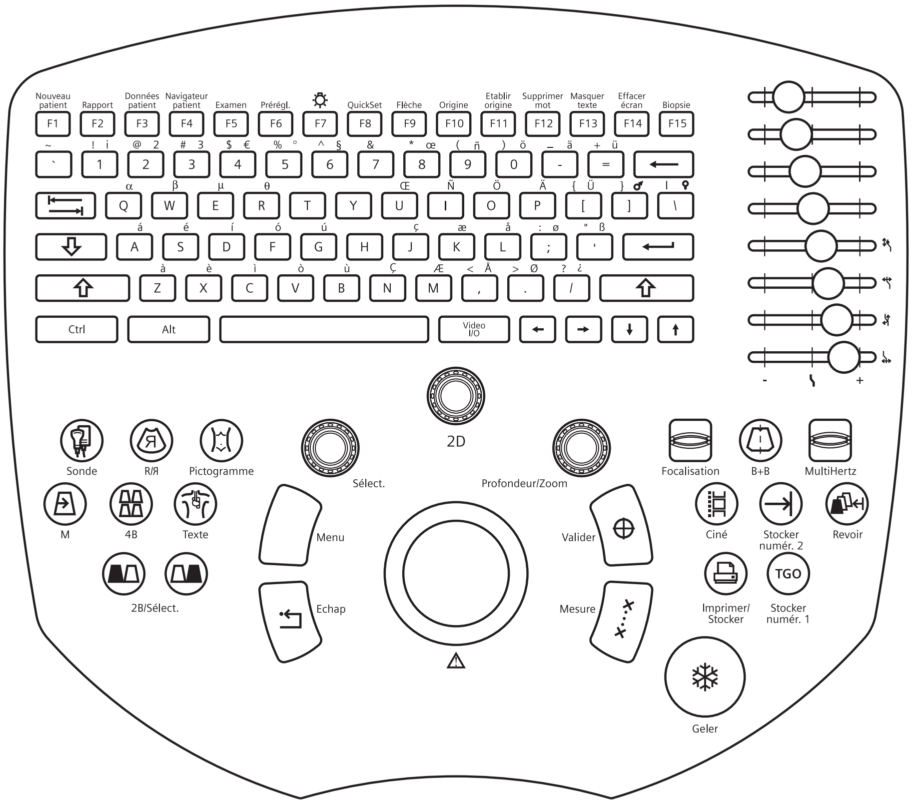
English



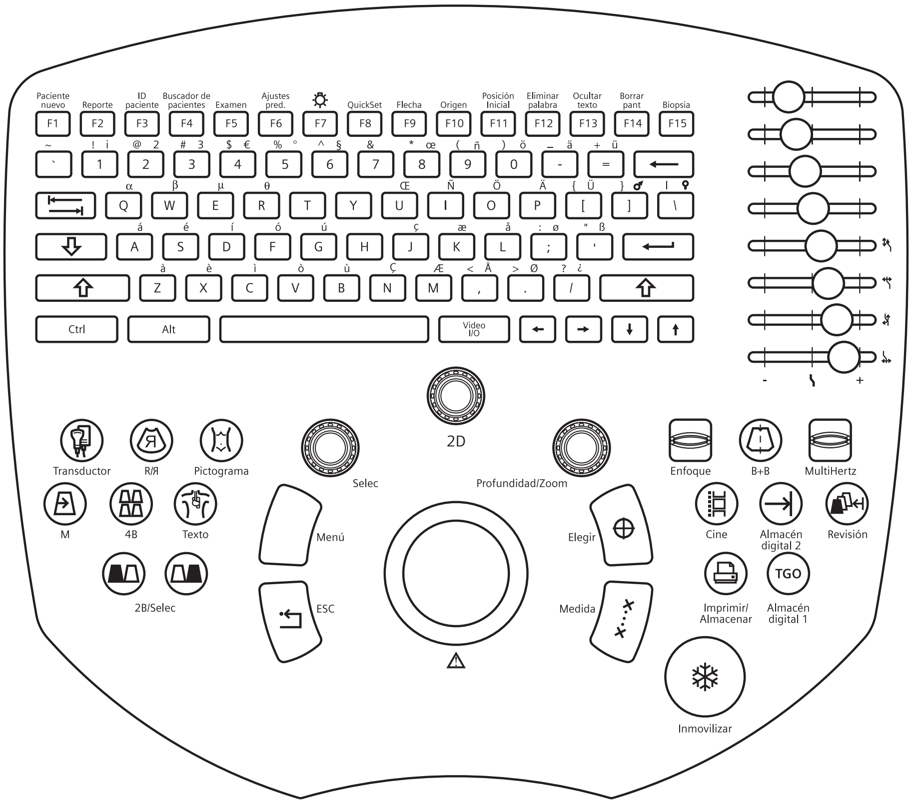
German



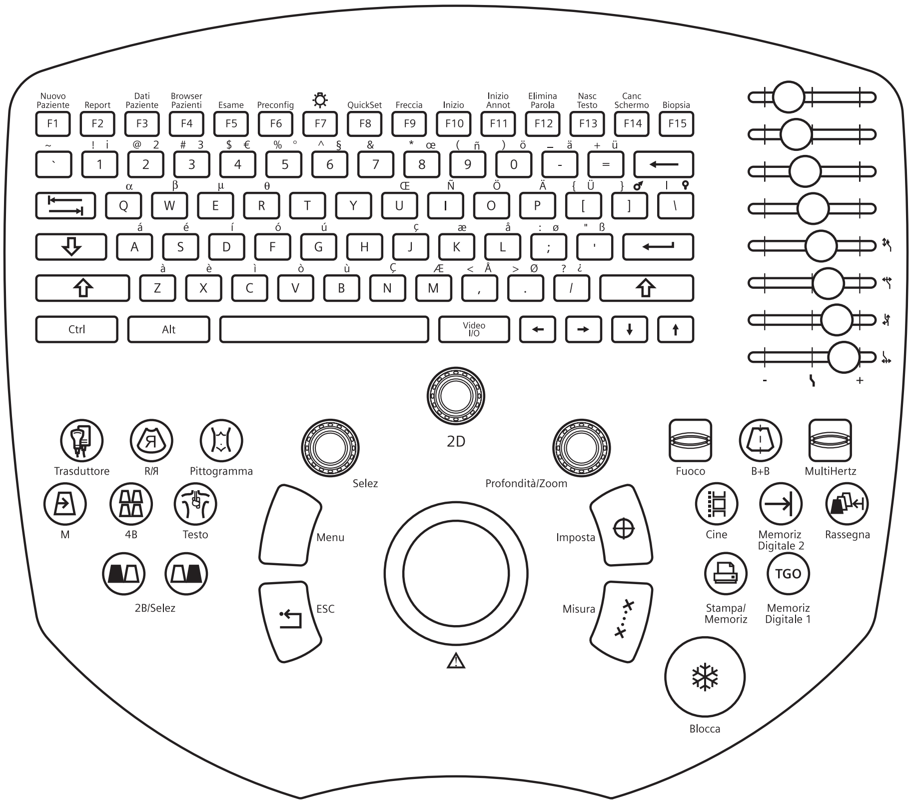
French



Spanish



Italian



3 System Presets

Setting General Preferences

When the ultrasound system is installed at your site, all system settings are factory-defined. You can use the options and settings available in the ***system presets*** to set up the ultrasound system with your preferences for imaging. System presets define the configuration of the system software whenever you power on the system.

System Reference

CD Disk Drive	Ch 4

[2] Instructions for Use

QuickSets	Ch A1

Using the System Presets

You can use the system presets at any time to change the factory (default) settings or modify your own presets and QuickSets.

It is advisable to back up your system presets and QuickSets on a CD to prevent accidental loss of your information. Presets saved on a disk also expedite the installation of a new system software release.

To access the system presets:

- Press the **F6** key on the keyboard.

  The system displays the **Preset Main Menu** screen with the most recently activated menu item selected. If no menu item has been activated since the system powered on, the system automatically selects (highlights) the **General** menu item on the left of the screen and displays its selections and options on the right of the screen.

Navigating the Menu

The system organizes the system presets by menu items, selections, and options. You cannot select the heading for menu items (for example, System Configuration). You can select an indented menu item listed below the heading (for example, General).

To use the Preset Main Menu:

1. After accessing the menu, roll the trackball up and down the left side of the screen to highlight a menu item.
2. Activate a highlighted menu item by pressing the **SET** key.

   The system displays either a new set of selections and options on the right of the **Preset Main Menu** screen or a full new screen.
3. Roll the trackball to an option or selection and then press the **SET** key.

Menu items marked with this symbol display a new screen.

To exit the Preset Main Menu:

- Save your changes by selecting the **Save** button on the screen.

  The system saves any new options and selections and returns to imaging.
- Discard your changes by selecting the **Cancel** button on the screen or by pressing the **ESCAPE** on the control panel or **F6** key on the keyboard.

  The system displays a dialog box if changes were made.

  – To discard your changes and redisplay the image screen, select the **OK** button.

  – To retain your changes and stay in the current screen, select the **Cancel** button.

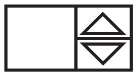
Making Screen Selections

Use the following techniques to make selections from the right side of the **Preset Main Menu** or in a newly-accessed screen. You can typically roll the trackball to position the trackball pointer on a menu item or setting and then press the **SET** key to complete the selection.

- Drop-down menus – To open the menu, roll the trackball to position the pointer on the arrow and then press the **SET** key. To make a selection, roll the trackball to highlight the selection and then press the **SET** key.

Drop-down menu.

- Spin buttons – To set a higher or lower numeric value, roll the trackball to position the pointer on the up or down arrow and press the **SET** key until the desired value displays.



Spin button.

- Check boxes – The option is selected when a checkmark displays inside the box and de-selected when the box is clear. To select or clear the check box, roll the trackball to position the pointer in the box and then press the **SET** key.

Check box.

- Buttons – To select a labeled button, roll the trackball to position the pointer on the button or the label and then press the **SET** key. In some places, only one button can be selected at a time.

Option button.

- Text entry – Roll the trackball to position the cursor in the field and then press the **SET** key. Use the keyboard to enter text. When finished, use the **TAB** key to move to another field or roll the trackball to reposition the cursor and then press the **SET** key.

Text entry.

Preset Main Menu

The left side of the **Preset Main Menu** screen lists the following menu items:

Menu Item	Allows you to...
System Configuration	
General	Enter the hospital name, designate format for date/time, height, and weight, and define other system settings.
Day / Time	Set the date and time, select the time zone, and specify a time server, if used.
Patient ID	Define settings for patient information.
Imaging	Designate maximum image brightness and video invert.
Peripheral	Assign connection for the RS-232C (Serial) port. Enable printing through the USB port. Designate the video source, format and impedance and the hard copy video polarity.
Customize Keys	Assign functions for the **PRINT/STORE**, **DIGITAL STORE 1**, and **DIGITAL STORE 2** keys and the optional footswitch Pedal 2. Specify rotation direction for the **DEPTH/ZOOM** control.
Boot Up	Select a transducer port to be active at boot up. Select an exam type or QuickSet to activate automatically at system boot up.
Storage	Designate the image and patient report storage destination. Specify whether measurement data is stored with the image.
Display	Activate the on-screen status display, DGC curve, time markers, and icons. Control the screen saver, playback code, and character brightness. Set monitor contrast and flicker control.
ReadySet ▷▷	Access a new screen. Establish onscreen icons that provide shortcuts to other screens and imaging and documentation functions. The **ReadySet** list is available for all exam types.
MUP[1]	Activate a password dialog box for use with the MODULARIS Uro Plus system.

[1] Requires software version 2.0 or higher

Menu Item	Allows you to...
Exam Configuration	
Default Settings ▷▷	Access a new screen. Designate display features and freeze response. Select pictograms and text labels for each exam type.
QuickSet Parameters ▷▷	Access a new screen if QuickSets have been defined. Edit certain parameters for QuickSets.
User-Defined Exam List ▷▷	Access a new screen. Enable or disable access to each exam type.
M & R Configuration	
M & R	Select caliper (measurement function) conventions and establish measurement and report presets for each type of exam. Specify a default measurement menu category of measurement methods or labels.
Options	
Installation From Key Disk	List installed option information, Install, Uninstall, or Update an option installed with a key disk.
Clip Capture[1]	Designate clip capture parameters, such as capture length and compression.
DIMAQ Utility ▷▷	Activate password-protection of patient data. Install printers.
DICOM ▷▷	Configure DICOM devices.
Networking	Configure the network export function.
Serviceability	
Preset/QuickSet Utility ▷▷	Access a new screen. Select data for backup to CD and specify the write speed for the CD-R/RW drive.
Service ▷▷	Access a new screen. Access password-protected service procedures.
System / Language	Upgrade the system software or change the operating language.

[1] Requires software version 2.0 or higher

General – System Configuration Selections

The **General** item on the **Preset Main Menu** provides the following selections:

Selection	Option(s)	Allows you to...
Hospital Name	Text entry	Enter the name of your hospital or clinic using up to 60 characters. The first 20 characters display in a report. You can modify this entry at any time.
Date Format	**Month/Day/Year** **Day/Month/Year** **Year/Month/Day**	Select the format for the date. The date displays on the image screen, in the Patient Data form, and on patient reports.
Height and Weight Format	**Feet/Pounds** **Centimeters/Kilograms**	Select the format for the display of the patient's height and weight used in the Patient Data entry form.
Beep	On Off	Select this check box to enable the beep to sound when a key is pressed.
Beep Volume	1 through 9	Set the volume of the beep. Option 1 is the quietest, Option 9 is the loudest. The **Beep** check box must be selected for the **Beep Volume** to be effective.
DGC Invert with Image Invert	On Off	Select this check box to invert the DGC graphic on the image screen along with the image when you rotate the image.
Tx Power Display Format	**dB** **%**	Determine the format of the transmit power display on the image screen. **dB** displays the transmit power in decibels. **%** displays the transmit power as a percentage.
Trackball Travel/Speed	**Low** **Medium** **High**	Select the responsiveness of the system to trackball movement. **Low** repositions an object a short distance with minimal trackball movement. **Medium** repositions an object a moderate distance with minimal trackball movement. **High** repositions an object a long distance with minimal trackball movement.
Text Character Size	8 through 18	Select the size of the font for displaying text annotation.
Arrow Size	8 through 18	Select the size of an arrow entered on the screen.
Delete Text on Unfreeze	On Off	Select this check box to erase on-screen text annotation after an image is unfrozen.
Default Annotation Type	**Anatomy** **Position**	Select the type of text displayed when you press the **TEXT** key. **Anatomy** displays anatomy annotations. **Position** displays body position annotations.
Delete Pictogram on Unfreeze	On Off	Select this check box to erase an on-screen pictogram after an image is unfrozen.
Confirmation Power SW Dialog	On Off	Select this check box to display a confirmation dialog box when the system is powered off.

Day/Time – System Configuration Selections

The Day/Time item on the **Preset Main Menu** provides the following selections:

Selection	Option(s)	Allows you to...
Date	**Month** _ _ **Day** _ _ **Year** _ _ _ _	Enter the current date.
Time	**Hour** _ _ **Minute** _ _ **Second** _ _	Enter the current time. The time displays on the Image screen.
Daylight Saving Time Adjustment (+1 Hour)	On Off	Quickly adjust the system clock to compensate for Daylight Saving Time. When this check box is selected, the system adds one hour to the clock.
Time Zone	Settings relative to GMT	Select the time zone relative to Greenwich Mean Time (GMT).
Time Server	Text entry	Enter the server that provides the time.
Use Time Server	On Off	Select this check box to user the time server.

Patient ID – System Configuration Selections

The **Patient ID** item on the **Preset Main Menu** provides the following selections:

Selection	Option(s)	Allows you to...
Hide Patient Demographic	On Off	Display or hide the patient demographics, such as the patient name and patient identification on the image screen.
AutoStore New Patient Form[1]	On Off	Automatically store a screen representation of the completed patient data form to the registered patient's study.

[1] Requires software version 2.0 or higher

Imaging – System Configuration Selections

The **Imaging** item on the **Preset Main Menu** provides the following selections:

Selection	Option(s)	Allows you to...
Max Brightness (BW)	**180 – 255**	Select a brightness level for the image display. A higher number designates a brighter image.
Video Invert	**Positive** **Negative**	Select the polarity of the video display for the main image screen. Text is always white against black or black against white. **Positive** displays a white image area against a black background. **Negative** displays a black image area against a white background.
Update Frames in 2D/M[1]	**1 sec** **2 sec** **3 sec**	Select the number of frames of 2D-mode images to be acquired during the image refresh at the end of the M-mode sweep for mechanical sector transducers.

[1] Requires software version 2.0 or higher

Peripheral – System Configuration Selections

The **Peripheral** item on the **Preset Main Menu** provides the following selections:

Selection	Option(s)	Allows you to...
External RS-232C Port	**Off** **Laser Printer** **PC2** **Card Reader**	Assign functionality to the serial port on the input/output panel of the ultrasound system. **Off** disables the RS-232C Serial port. **Laser Printer** sends report data, including graphics such as growth graphs, to a laser printer, using the HP PCL 3 protocol. **PC2** sends OB report data to a PC. **Card Reader** reads the patient name and ID into the Patient Data form.
USB Printer	On Off	Enable Patient Report printing through the USB port. Select an available printer from a list.
Video Format	**NTSC** **PAL**	Select the video format for output to the onboard printer.
Video Input Source	**Composite** **S-VHS**	Select the input source for the VCR.
Video Input Impedance	**75 [ohm]** **Hi-Z**	Select the input impedance. Select **75** for inputs to the system monitor only. Select **Hi-Z** for inputs routed to other devices.
Hard Copy Video Polarity (Image)	**Positive** **Negative**	Select the polarity of the video output for an image. **Positive** displays a white image against a black background. **Negative** displays a black image against a white background.
Hard Copy Video Polarity (Report)	**Positive** **Negative**	Select the polarity of the video output for a report. **Positive** displays a white report against a black background. **Negative** displays a black report against a white background.

Customize Keys – System Configuration Selections

The **Customize Keys** item on the **Preset Main Menu** provides the following selections:

Note: The MUP option is available for use only with the MODULARIS Uro Pro system.

[1] Instructions for Use

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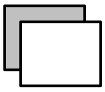
Selection	Option(s)	Allows you to...
PRINT STORE key	**B/W Print** **Disk Store** **DICOM B/W Printer** **D. Store & B/W Pr.** **MUP**	Assign functionality to the **PRINT STORE** key.
DIGITAL STORE 1 key	**B/W Print** **Disk Store** **DICOM B/W Printer** **D. Store & B/W Pr.** **TGO** **Clip Capture**[1] **MUP**	Assign functionality to the **DIGITAL STORE 1** key.
DIGITAL STORE 2 key	**B/W Print** **Disk Store** **DICOM B/W Printer** **D. Store & B/W Pr.** **TGO** **Clip Capture**[1] **MUP**	Assign functionality to the **DIGITAL STORE 2** key.
Pedal 2 function	**B/W Print** **Disk Store** **Clip Capture**[1]	Assign foot pedal 2 functionality to the optional footswitch.
Zoom/Depth Direction	**Clockwise** **Counterclockwise**	Select which direction increases zoom depth.

[1] Requires software version 2.0 or higher

Boot Up – System Configuration Selections

The **Boot Up** item on the **Preset Main Menu** provides the following selections:

Selection	Option(s)	Allows you to...
Transducer Port Active on Boot Up	**LC2** **LC1** **S1**[1]	Select the transducer port to be active when you power on the system. **Note:** Option **S1** requires a mechanical sector port.
Boot Up Exam & QuickSet		The **Boot Up Exam & QuickSet List** screen appears. Select a specific exam type or QuickSet to be active when you power on the system.

Storage – System Configuration Selections

The **Storage** item on the **Preset Main Menu** provides the following selections:

Selection	Option(s)	Allows you to...
Image with Caliper	**Yes** **No**	Select whether to store caliper (measurement) information with the image.
Autostore to Network	On Off	Automatically save the current study to the network when the study (examination) is ended.
Autostore to DICOM	On Off	Automatically transfer the contents of the **DICOM Store Queue** to the DICOM storage server when the study (examination) is ended.

[1] Requires software version 2.0 or higher

Display – System Configuration Selections

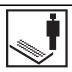
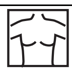
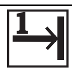
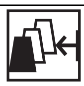
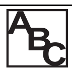
The **Display** item on the **Preset Main Menu** provides the following selections:

Selection	Option(s)	Allows you to...
System Status Display	On Off	Display the parameters in the Image Parameter area at the bottom of the image screen.
Screen Saver	On Off	Activate or deactivate the screen saver.
Screen Saver Type	**Black** **SONOLINE**	Select either a black background or a SONOLINE logo background.
Screen Saver Time	**5min.** **10min.** **15min.** **20min.**	Select the time delay before the system activates the screen saver.
DGC Curve Display	**Off** **Always On** **Time Out**	Select when the DGC graphic displays on the image screen. **Off** prevents the DGC from displaying on the image screen. **Always On** displays the DGC continuously on the image screen. **Time Out** removes the DGC from the screen three seconds after you adjust the curve. When you adjust the DGC controls again, the curve reappears on-screen.
Time Marker Display	On Off	Display a time marker on the image screen.
Scan Plane Icon[1]	On Off	Display a scan plane symbol on the image screen when a mechanical sector endocavity transducer is active.
Playback Code	On Off	Select when the encoded image displays on the screen. The encoded image information is used to make measurements on the images displayed from a video tape. **Off** prevents the encoded image information from displaying on the image screen. **On** displays the encoded imaging information continuously on the image screen.
Character Brightness	**1, 2, 3, 4, 5, 6, 7**	Select display character brightness.
Flicker Control	On Off	Select to improve the display of on-screen elements, images, and reports on an external monitor connected to the analog video output port on the ultrasound system.
Monitor Contrast	**Low** **High**	Select the amount of contrast for the monitor.

[1] Requires software 2.0 or higher

ReadySet – System Configuration Selections

Use this selection to establish shortcuts to other screens and imaging and documentation functions. The shortcuts display as icons at the right side of the imaging screen. The ReadySet list is available for all exam types.

Selection	Icon	Description
Arrow		Displays an arrow on the image that you can position using the trackball and orient using the **SELECT** control.
Biopsy		Activates the Biopsy function.
Modify		Provides a shortcut for modifying a measurement that has just been completed.
Current Patient		Displays the (current) Patient Data form.
Print Store		Prints to the output device selected in the system presets.
Angle (FOV)		Assigns the trackball to adjust the Field of View.
Hide Text		Toggles the display of on-screen text on and off.
L/R Flip		Changes the scan direction of a transducer.
New Patient		Displays a (new) Patient Data form.
Pictogram		Displays pictograms for the current exam.
Digital Store 1		Transfers exam data to the device selected in the system presets.
Digital Store 2		Transfers exam data to the device selected in the system presets.
Report		Displays the Patient Report.
Review		Activates review of stored exam data.
Rotate		Rotates the image 90°.
Split		Creates two live images, side by side.
Text		Places the text cursor on the image.
Worksheet		Displays the Worksheet.
Zoom		Activates a zoom window on the image.

The system displays a new screen when you select **ReadySet**, presenting the choices described below.

- To reaccess the **Preset Main Menu** screen and retain new screen selections, roll the trackball to the **OK** button and then press the **SET** key.
- To reaccess the **Preset Main Menu screen** and discard new screen selections, roll the trackball to the **Cancel** button and then press the **SET** key.

Selection	Option(s)	Allows you to...
ReadySet Icon Display[1]	**Always On** **With On-screen menu**	Display the ReadySet icons on the image screen at all times or display the ReadySet icons only while an on-screen menu is active.

To add an item to the ReadySet list:

Note: You can add up to six ReadySet items.

1. Roll the trackball to an item in the **Selectable** column and then press the **SET** key.

   The system highlights the item.

2. Roll the trackball to the **Add** button and then press the **SET** key.

   The item is moved to the bottom of the **Order** column and its icon displays at the bottom of the **Preview** box.

To delete an item from the ReadySet list:

1. Roll the trackball to an item in the **Order** column and then press the **SET** key.

   The system highlights the item.

2. Roll the trackball to the **Delete** button and then press the **SET** key.

   The item displays in the **Selectable** column and its icon is removed from the **Preview** box.

[1] Requires software version 2.0 or higher

To rearrange items in the ReadySet list:

1. Roll the trackball to an item in the **Order** column and then press the **SET** key.

   The system highlights the item.

2. To move the item up or down in the list, roll the trackball to the **Up** or **Down** button and then press the **SET** key as required to reposition the item.

   The icon for the item is repositioned in the **Preview** box.

To separate items into groups in the ReadySet list:

Note: You can add up to three separators.

1. Roll the trackball to the **Separator** button and then press the **SET** key.

   The system displays the separator at the bottom of the **Order** column and the **Preview** box.

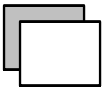
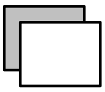
2. To move the separator up or down in the list, roll the trackball to the **Up** or **Down** button and then press the **SET** key as required to reposition the separator.

   The icon for the separator is repositioned in the **Preview** box.

Default Settings – Exam Configuration Selections

The system displays a new screen when you select **Default Settings**, presenting the choices described below.

- To reaccess the **Preset Main Menu** screen and retain new screen selections, roll the trackball to the **Save** button and then press the **SET** key.
- To reaccess the **Preset Main Menu** screen and discard new screen selections, roll the trackball to the **Cancel** button and then press the **SET** key.
- To automatically change all selections on this screen to factory defaults for the selected exam, roll the trackball to the **Default** button and then press the **SET** key. Repeat this process as required to restore defaults for other exam types.

Selection	Option(s)	Allows you to...
Exam	**Abd** **OB** **Early OB** **Breast** **Thyroid** **Testicle** **GYN** **Ortho** **Cardiac** **Urology** **Cranial** **Rectal**[1] **EM**[1]	Select an exam for which you want to specify default settings to automatically become active when the exam is activated. The system lists only the exam types enabled on the **User-Defined Exam List** configuration screen.
Pictogram List		Select pictograms to display as selections when the **PICTOGRAM** key is pressed during the selected exam. See page 3-19 for more information.
Text Annotation		Select labels for anatomy and position to display as menu selections for the exam. See page 3-21 for more information.
Biopsy	On Off	Activate the Biopsy function automatically when the selected exam is activated.
Automatic Freeze Response	**Cine** **Caliper** **Text** **Picto** **None**	Select the system response when the **FREEZE** key is pressed. **Cine** activates the CINE function. **Caliper** activates the Measurement function. **Text** activates the Annotation function. **Picto** activates the Pictogram function. **None** freezes the image without changing the current function; if no function is active, the system activates the CINE function.
Bypass M Cursor Display	On Off	Select the system response when the **M** key is pressed. Select this check box to immediately display M-mode. De-select the check box to initially display an M-mode cursor in the 2D-mode image; the **M** key must then be pressed a second time for full M-mode to display.
2D/M Display Format	**40/60** **1/2-1/2** **1/3-2/3**	Specify the image screen layout when two imaging modes are active. **40/60** presents 2D-mode in the left 40% of the screen and the M-mode sweep in the right 60% of the screen. **1/2-1/2** presents 2D-mode on the right side of the upper 1/2, with M-mode in the lower 1/2. **1/3-2/3** presents 2D-mode on the right side of the upper 1/3, with M-mode in the lower 2/3.

[1] Requires software version 2.0 or higher

Selecting Pictograms

To begin pictogram selection, roll the trackball to the **Pictogram List** button on the **Default Settings** screen and then press the **SET** key. The system displays the **Customize Pictogram List** screen, with the full selection of available pictograms on the top. On the bottom, the system displays the pictogram menu selections that will appear for this exam when the **PICTOGRAM** key is pressed.

To add pictogram selections:

1. Locate the required pictogram in the selection of available pictograms. To scroll through the selection, roll the trackball to the up or down arrow on the scroll bar and then press the **SET** key.
2. Roll the trackball to the displayed pictogram and then press the **SET** key.

   The system displays a box around the selected pictogram.

3. Roll the trackball to the **Add** button and then press the **SET** key.

   The pictogram is copied to the next available cell in the Pictogram List Display Preview on the bottom. You can copy the same pictogram repeatedly.

To delete pictogram selections:

1. Locate the required pictogram selection. To scroll through the selections, roll the trackball to the right or left arrow on the scroll bar and then press the **SET** key.
2. Roll the trackball to the displayed pictogram and then press the **SET** key.

   The system displays a box around the selected pictogram.

3. Roll the trackball to the **Delete** button and then press the **SET** key.

   The system deletes the pictogram from the Pictogram List Display Preview on the bottom.

To insert a pictogram between existing selections:

1. Roll the trackball to an available pictogram and then press the **SET** key.

   The system displays a box around the selected pictogram.

2. Roll the trackball to position the cursor in the Pictogram List Display Preview, on the pictogram to the right of the position in which you want to add the new pictogram, and then press the **SET** key.

   The system displays a box around the selected pictogram.

3. Roll the trackball to the **Insert** button and then press the **SET** key.

   The system inserts the pictogram to the left of the selected position in the Pictogram List Display Preview.

To reposition the transducer inside a pictogram:

1. Roll the trackball to position the cursor on a pictogram in the Pictogram List Display Preview and then press the **SET** key.

   The system displays a box around the selected pictogram.

2. Roll the trackball to the **Transducer** button and then press the **SET** key.
3. Roll the trackball to position the transducer indicator and then press the **SET** key.

To rearrange pictogram selections:

1. Roll the trackball to a pictogram in the Pictogram List Display Preview on the bottom and then press the **SET** key.

   The system displays a box around the selected pictogram.

2. Roll the trackball to the **<<** or **>>** button and then press the **SET** key.

   The selected pictogram moves left or right on the Pictogram List Display Preview page.

3. Continue pressing the **SET** key with the trackball positioned on the **<<** or **>>** button to step the pictogram left or right.
4. To move the pictogram to a higher page number, use only the **>>** button. To move the pictogram to a lower page number, use only the **<<** button.

To reset the pictograms to factory defaults:

- Roll the trackball to the **Default** button and then press the **SET** key.

  The system displays a message asking you to confirm the action. To discard all pictogram customization for this exam and display the factory default selections, roll the trackball to the **OK** button and then press the **SET** key. To retain your selections, roll the trackball to the **Cancel** button and then press the **SET** key.

To exit the Customize Pictogram List screen:

1. To save changes and immediately reaccess the Default Settings screen, roll the trackball to the **OK** button and then press the **SET** key.
2. You can also exit the Customize Pictogram List screen by pressing the **ESCAPE** key on the control panel or by rolling the trackball to the **Cancel** button and then pressing the **SET** key.

   If you have made changes to the pictogram selections, the system prompts you to save the changes by selecting **Yes** or to discard the changes by selecting **No**.

Selecting Text Annotation

Each exam type has labels for anatomical structures and body positions that can display as menu selections when the exam type is active. The labels are stored in libraries that you can edit for each exam type. The text labels display as menu selections when you press the **TEXT** key on the control panel.

To begin text editing, roll the trackball to the **Text Annotation** button on the Default Settings screen and then press the **SET** key. The system displays the Customize Annotation List screen, with the existing text annotation menu selections on the right. Separate text selections are available for anatomy and position.

To select Anatomy or Position text:

- Roll the trackball to the **Anatomy** or **Position** button on the Customize Annotation List screen and then press the **SET** key.

  The system displays the Anatomy or Position text selections for the selected exam.

To access other pages in the Onscreen Menu (OSM) Preview:

- To access the next higher page, roll the trackball to the **Next** button and then press the **SET** key.

To add text annotation selections:

1. Roll the trackball to the text entry field below the **Anatomy** and **Position** buttons and then press the **SET** key.
2. Use the keyboard to enter in up to 24 characters.
3. Roll the trackball to the **Insert** button and then press the **SET** key.

   The system inserts the text immediately above the active position in the OSM Preview on the right. The active position is surrounded by a box and initially displays in the lower right of the OSM Preview. To change the insert point, roll the trackball to any of the other text positions and then press the **SET** key. New text will then be inserted immediately above this new, boxed text position.

To delete text annotation selections:

1. Roll the trackball to one of the text positions in the OSM Preview and then press the **SET** key.

   The text position becomes active and is surrounded by a box.

2. Roll the trackball to the **Delete** button and then press the **SET** key.

   The active text is deleted and the text position is left blank.

To rearrange text annotation selections:

1. Roll the trackball to a text position and then press the **SET** key.

   The text position becomes active and is surrounded by a box.

2. Roll the trackball to the **Up** or **Down** button and then press the **SET** key.

   The selected text moves up or down on the OSM Preview page.

3. Continue pressing the **SET** key with the trackball positioned on the **Up** or **Down** button to step the text up or down on the page.
4. To move the text to a higher page number, use only the **Up** button. To move the text to a lower page number, use only the **Down** button.

To reset the text annotations to factory defaults:

- Roll the trackball to the **Default** button and then press the **SET** key.

  The system displays a message asking you to confirm the action. To discard all text customization for this exam and display the factory default selections, roll the trackball to the **OK** button and then press the **SET** key. To retain your selections, roll the trackball to the **Cancel** button and then press the **SET** key.

To exit the Customize Annotation List screen:

1. To save changes and immediately reaccess the Default Settings screen, roll the trackball to the **OK** button and then press the **SET** key.
2. You can also exit the Customize Annotation List screen by pressing the **ESCAPE** key on the control panel or by rolling the trackball to the **Cancel** button and then pressing the **SET** key.

   If you have made changes to the text annotation, the system prompts you to save the changes by selecting **Yes** or to discard the changes by selecting **No**.

QuickSet Parameters – Exam Configuration Selections

This selection allows you to configure a QuickSet as you would select default settings for an exam type. Text Annotation editing is not available through QuickSet Parameters.

To access a QuickSet:

1. Roll the trackball to **QuickSet Parameters** in the **Preset Main Menu** and then press the **SET** key.

   The system displays the **QuickSet List**.

2. Roll the trackball to a QuickSet and then press the **SET** key.
3. Roll the trackball to the **OK** button and then press the **SET** key.

   The system displays the **Customize Presets** screen. Refer to "Default Settings" for instructions on using this screen.

User-Defined Exam List – Exam Configuration Selections

Use this selection to customize items included in the exam list. You can include (**Enable**) or exclude (**Disable**) each exam type. The active exam type and the default exam type at system boot-up cannot be disabled. Changes display when the exam list is accessed by pressing the **F5** key on the keyboard. Changes also display whenever the exam list is accessed from the **Preset Main Menu** or **Patient Data** screen.

To change the exam list:

1. On the **Preset Main Menu**, roll the trackball to **User-Defined Exam List** and then press the **SET** key on the control panel.

   The **User-Defined Exam List** appears.

2. To include an exam in the list, roll the trackball to the **Enable** button for that exam and then press the **SET** key.
3. To exclude an exam from the list, roll the trackball to the **Disable** button for that exam and then press the **SET** key.
4. Repeat steps 2 and 3 as required to construct the required exam list.
5. Roll the trackball to the **Save** button and then press the **SET** key to store the new list. To reject the changes, roll the trackball to the **Cancel** button and then press the **SET** key.

To reset the exam list:

1. Roll the trackball to the **Default** button and then press the **SET** key.

   The system asks you for confirmation.

2. Roll the trackball to the **OK** button and then press the **SET** key.

   The system sets all exams to **Enable**.

M & R – Measurement & Report Configuration Selections

General Caliper Settings

The first section of the M&R screen contains general settings that apply to all exam types.

Selection	Option(s)	Allows you to...
Caliper Default Position	**Center** **Menu** **Depth**	Assign trackball control to the pointer or measurement marker when the measurement function is initiated. **Center** displays the first marker in the center of the image screen. A depth value does not display. **Menu** displays the trackball pointer in the Measurement Menu if a label is available. For exam types with no labels, the trackball pointer remains in the center of the image screen when **Menu** is selected. **Depth** displays the first marker in the center of the image screen, with a dotted line representing the depth from the skin line. A depth value displays in the Measured Results area of the image screen until you anchor the first marker.
Default Memory Category	**Label** **General**	**Label** displays exam-specific labels in the Measurement Menu when the measuremetn function is activated. **General** displays the list of general measurement methods specified for the exam type and imaging mode.
Shape Pattern	**x** **+**	Specify the shape of the caliper. You can specify one shape at a time for the entire system. Multiple measurements use the same shape, but are differentiated by number.
Shape Size	**Small** **Medium** **Large**	Specify the size of the caliper for use by the entire system. A smaller size may make a larger number of caliipers easier to view.
Measurement Results Background	**On** **Off**	Activate or deactivate a background for the Measured Results section of the image screen.
Urology Stepsize[1]	1 to 20 mm, in 1 mm increments	Select a Urology Stepsize setting for use with the Incremental Volume calculation.

[1] Requires software version 2.0 or higher

Measurement and Report Preset Settings

The Measurement and Report Preset section of the M&R selection allows you to customize each exam type. The following table identifies customization items applicable for each exam type. Items shown with a check mark use common methods that are described on the page number indicated. Some exam types use special customization routines; these are also referenced to applicable page numbers.

Exam Type	**Measure-ment Method**	**Customize General Measure-ment Menu**	**Calculation Item**	**Measure-ment Order**	**Display Item**	**User-Defined Formulas, Tables, and Labels**	**Comments Library for Report**
Refer to:	***Page 3-25***	***Page 3-27***	***Page 3-49***	***Page 3-28***	***Page 3-36***	***Page 3-30***	***Page 3-31***
Abd	✓	✓					
OB	***Refer to Pages 3-35 to 3-46***						
Early OB							
Breast	✓	✓					
Thyroid	✓	✓					
Testicle	✓	✓					
GYN	✓	✓		✓	✓	✓	✓
Ortho	✓	✓			✓		✓
Cardiac	✓	✓		***Page 3-47***	✓		✓
Urology	✓	✓			✓		✓
Cranial	✓	✓					
Rectal[1]	✓	✓			✓		✓
EM[1]	✓	✓	✓		✓		✓

[1]Requires software version 2.0 or higher

Measurement Method

Use this selection to establish a shortcut to a specific measurement method. The upper section of this screen allows you to select a method that will appear at the top of the Measurement Menu when the system first enters the measurement function for the specified imaging mode. This technique can eliminate one or two menu selection steps.

The lower section of this screen allows you to select a specific method for automatic activation when a general measurement method is selected in the measurement function. For example, if **Ellipse** is selected in the **Area** field, selecting **Area** from the list of general measurement methods automatically activates the Ellipse method.

Note: The Default Measurement Method may amend the Default Measurement Method by Mode. If a general measurement method is selected by mode, a default method selected under that general method category will become the default method by mode. For example, if you select **Area** as the method by mode in the upper screen and **Ellipse** as the default for Area in the lower screen, Ellipse will appear at the top of the Measurement Menu when the system enters the measurement function for that imaging mode.

To select the Default Measurement Method by Mode:

1. For each imaging mode, roll the trackball to the arrow on the right side of the method field and then press the **SET** key.

   The system displays a pull-down menu of available measurement methods for this imaging mode.

2. Roll the trackball to highlight a measurement method and then press the **SET** key.

   The highlighted method becomes the default for this imaging mode. This method will display at the top of the Measurement Menu when the measurement function is activated in this imaging mode.

To select the Default Measurement Method:

1. For each measurement method category, roll the trackball to the arrow on the right side of the method field and then press the **SET** key.

   The system displays a pull-down menu of specific methods.

2. Roll the trackball to highlight a measurement method and then press the **SET** key.

   The highlighted method becomes the default for this method category. This specific method will display at the top of the Measurement Menu when the general measurement method is selected.

Customize General Measurement Menu

Use this selection to designate the general measurement methods available when the system enters the measurement function for the selected exam type. Change the choices separately for 2D-mode and M-mode.

To select a mode:

1. Roll the trackball to the down arrow for the Mode drop-down menu, select **2D-Mode** or **M-Mode**, and then press the **SET** key.
2. Add, delete, or rearrange measurement methods as required for each mode.

To add methods:

1. Roll the trackball to highlight one of the selectable methods on the left and then press the **SET** key.

   The system highlights the method.

2. Roll the trackball to the **Add** button and then press the **SET** key.

   The highlighted method is added to the Measurement Order list on the right.

3. Repeat steps 1 and 2 as required.

To delete methods:

1. Roll the trackball to a method in the measurement order list on the right and then press the **SET** key.

   The system highlights the name.

2. Roll the trackball to the **Delete** button and then press the **SET** key.

   The name is moved to the selectable method list on the left.

3. Repeat steps 1 and 2 for the other selected methods, as required.

To rearrange methods:

1. Roll the trackball to one of the methods in the measurement order list on the right and then press the **SET** key.

   The system highlights the method.

2. Roll the trackball to the **Up** or **Down** button and then press the **SET** key.

   The method moves up or down one space in the list.

3. Repeat steps 1 and 2 as required to create a restructured measurement order list.

To reset menu selections for both modes back to factory defaults:

1. Roll the trackball to the **Default** button and then press the **SET** key.

   The system prompts you to confirm your choice.

2. Roll the trackball to the **OK** button and then press the **SET** key to continue.

Measurement Order

Use this selection to add and delete labels and to rearrange the order in which labels appear in the Measurement Menu. The **Customize General Measurement Menu** screen presents two columns of entries: **Selectable Method** on the left and **Measurement Order** on the right. Add labels from left to right or delete labels from right to left. User-defined labels initially appear on the left.

To add labels:

1. Roll the trackball to a selectable label on the left and then press the **SET** key.

   The system highlights the label.

2. Roll the trackball to the **Add** button and then press the **SET** key.

   The label is moved to the bottom of the measurement order list on the right.

3. Repeat steps 1 and 2 for other labels, as required.

To delete labels:

1. Roll the trackball to a label in the measurement order list on the right and then press the **SET** key.

   The system highlights the label.

2. Roll the trackball to the **Delete** button and then press the **SET** key.

   The label is moved to the bottom of the selectable label list on the left.

3. Repeat steps 1 and 2 for other labels, as required.

To rearrange labels:

1. Roll the trackball to one of the labels in the measurement order list on the right and then press the **SET** key.

   The system highlights the label.

2. Roll the trackball to the **Up** or **Down** button and then press the **SET** key.

   The label moves up or down one space in the list.

3. Repeat steps 1 and 2 as required to create a restructured measurement order list.

To reset labels back to factory default positions:

1. Roll the trackball to the **Default** button and then press the **SET** key.

   The system prompts you to confirm your choice.

2. Roll the trackball to the **OK** button and then press the **SET** key to continue.

The gynecology exam **Customize Measurement Order** screen contains an extra field for specifying the Follicle Measurement Method.

To select the Follicle Measurement Method (Gynecology exam):

1. Roll the trackball to the arrow on the right of the Follicle Measurement Method field and then press the **SET** key.

   The system displays a pull-down menu of available selections.

2. Roll the trackball to highlight one of the selections and then press the **SET** key.

   The highlighted selection becomes the new Follicle Measurement Method.

Display Item

Use this selection to control display of various items on the measurement screen and in the patient report. The Display Item screen is unique for each exam type.

Selection	Option(s)	Allows you to...
Measurement Screen		
Abbreviated Display of Results	On Off	Select this check box to display in the Measured Results only labels to which measurements have been assigned. De-select the check box to display in the Measured Results all the labels on the Measurement Menu.
Hip Angle Graph	On Off	Display the sonographic hip angle graph when an Ortho exam measurement has been completed.
Enable Early OB Caliper	On Off	Enable the selection of measurement labels for Early OB in the list of menu categories for the GYN exam.
Default Measurement Title	**2D-Mode** **M-Mode**	Select the default measurement type for each mode for the Cardiac exam.
Data Averaging	**Direct** **Average**	Display the value of the last measurement or an average of all measurements in the Cardiac exam.
Report		
Physician ID[1], **Operator ID**[2]	On Off	Include the Physician ID number entered in the Patient Data form at the bottom of the report page.
Referring MD[1], **Report Referring MD**[2]	On Off	Include the Referring MD name entered in the Patient Data form at the bottom of the report page.

User-Defined Label

Use this selection to designate special measurement labels in the GYN exam type. Use up to eight characters.

To create a user-defined label:

1. Roll the trackball to the **NAME** field and then press the **SET** key.
2. Use the keyboard to type in a label name.
3. Repeat steps 1 and 2 for each label.
4. You can also select a measurement method to associate with a 2D-mode label. Roll the trackball to the down arrow to the right of the Method field and then press the **SET** key.
5. Roll the trackball to one of the measurement methods and then press the **SET** key.
6. When all labels have been entered, roll the trackball to the **OK** button and then press the **SET** key.

Note: For user-defined labels to appear in the Measurement Menu, you must add them to the Measurement Order list using the **Measurement Order** screen.

[1] Requires software version 2.0 or higher

[2] For software versions below 2.0

Comments Library for Report

For exam types with reports, you can enter five comments for automated inclusion into the report. A maximum of 69 characters is allowed per comment. However, since the report will only accept a total of 77 characters, it is advisable to make each of the five comments as short as possible.

Creating a library of comments for a patient report saves you time, particularly for recurring examinations. Rather than entering a phrase in the comment section of a report, you can access pre-defined comments for quick entry by rolling the trackball to the **Comments** button and then pressing the **SET** key.

To enter comments:

1. Roll the trackball to one of the comment fields and then press the **SET** key.
2. Use the keyboard to type in up to 69 alphanumeric characters.
3. Repeat steps 1 and 2 for each required comment.
4. Complete comment entry by rolling the trackball to the **OK** button and then pressing the **SET** key.

Installation From Key Disk – Options Selections

This selection provides an overview of optional features that have been installed on the ultrasound system with the key disk procedure. Selections for installing new options, uninstalling existing options, or updating existing options are available. The key disk for the option must be installed to perform any of these operations.

Clip Capture

(Requires software version 2.0 or higher)

Note: A clip stored during CINE review contains all frames of CINE data (except frames excluded from CINE review). The number of frames in a clip stored during live imaging is determined by the capture rate (40 Hz) and the length configured in the system presets. For example, if you select a length of two seconds and then store a clip, then the system stores 80 frames (2 seconds * 40 Hz).

Selection	Option(s)	Allows you to...
Clip Length	**1** **2**	Select the length of the clip in seconds.
Image Compression	**Low** **High**	Select level of image resolution and file size.

DIMAQ Utility – Options Selections

For software versions 2.0 and higher: The system indicates the type of accessibility (such as **Unlocked**) for DIMAQ studies in the **DIMAQ Study Access** section of the screen.

The table indicates titles of sections using brackets ([]).

Selection	Description
[DIMAQ Study Access]	
Password	Displays a dialog box for entry of the new password. If a password already exists, then the system also requires entry of the existing password.
Lock DIMAQ	Reactivates password protection. **Note:** This selection is available when you activate password protection and then enter the password to view patient information.
Password Protection	**Enable** activates password protection after confirming the password. **Disable** deactivates password protection after confirming the password.
[Printer]	
Autoprint Images[1]	Automatically prints the displayed image to the selected USB printer when you store the image to the ultrasound system's hard disk using a documentation control. **Note:** To enable or disable this function without accessing the system presets, use the **Ctrl+U** shortcut (press and hold the **Ctrl** key on the keyboard and then press the **U** key on the keyboard).
[CDR]	
Write speed	Specifies the write speed for the CD drive on the ultrasound system.
[Network][2]	
Show network status[2]	When enabled (selected), indicates the status of network connection in the **Network** section of the Study screen.
[HD Defragmentation][1]	
Defrag Now[1]	Defragments the system's hard disk.

[1] Requires software version 2.0 or higher

[2] For software versions below 2.0

DICOM – Options Selections

You can verify selection of an existing setup, select another setup, edit an existing setup, or create a new setup for the host, storage server, color printer, and black and white printer using the system presets on the ultrasound system.

You can verify selection of an existing setup, select another setup, edit an existing setup, or create a new setup for the Worklist server.

The DICOM chapter describes the setup options in detail.

System Reference

DICOM Ch 6

Networking – Options Selections

You can change the active setup by selecting a host or export host. You can also edit an existing host or create a new host.

System Reference

Network Export Function Ch 7

Preset/QuickSet – Serviceability Selections

You can specify which Preset and QuickSet files the system saves to CD. You can save all files or selected files in each category, and you can select the appropriate write speed for the CD-R/RW drive.

[2] Instructions for Use

QuickSet Feature Ch A1

Service – Serviceability Selections

This selection provides the system serial number and software version number, along with password-protected service protocols. The service function allows service personnel to confirm the correct operation of the hardware and to detect any failed circuit boards. The Service function is supported for the English language only. Exiting the Service function returns the system to imaging.

System/Language – Serviceability Selections

This selection changes the system language and upgrades system software while retaining or initializing the system presets. Changing the system language will require you to restart the system.

[1] Instructions for Use

Software Installation Ch 4

Customizing OB and Early OB Measurements, Calculations, and Reports

The Measurement and Report Presets for the OB and Early OB exams include generic and exam-specific descriptions.

Measurement and Report Preset	Description
Menu List	
Measurement Method	Refer to Measurement and Report Settings, page 3-25.
Customize General Measurement Menu	Refer to Measurement and Report Settings, page 3-27.
Item & Reference Selection	
Standard OB	Unique to the Standard OB exam – see page 3-35.
Early OB	Unique to the Early OB exam – see page 3-39.
Standard OB/Early OB	
Display Configuration,	Unique to the Standard OB/Early OB exams – see page 3-39.
Comment Library for Report	Refer to Comments Library for Report in Measurement and Report Settings, page 3-31.
Customize Growth Analysis Graphs	Unique to the OB/Early OB exams – see page 3-40.
Standard OB/Early OB User-Defined	
EFW Formula, **Measurement Label**, **MA Data**, **GA Data**, **Ratio Formula**	Unique to the Standard OB/Early OB exams For a description of Formulas– see page 3-41. For a description of Tables– see page 3-44. For a description of Measurement Labels– see page 3-46.

Item & Reference Selection, Standard OB

Use these preset selections to customize the content of the Measurement Menu and patient report.

- Specify which labels display in the Measurement Menu and the worksheet, and the order in which they display. The selected labels display along with assigned values in the Measured Results and the patient report. Use the Display Configuration checkboxes to determine whether the labels display when no values are assigned to them.
- Add user-defined 2D-mode measurement labels to the list of displayed labels.
- Assign a reference for each parameter and calculation on which tables and formulas are based.
- Assign a method, **Direct** or **Average**, for determining the value for a parameter or calculation that displays in the worksheet and in the patient report. In the Direct method, the system displays the last value assigned to a measurement label. In the Average method, the system performs an average of the values as each value is assigned to the label and displays the calculated average.

2D/M-Mode and Ratio Tabs

This selection allows you to edit the Measurement Item list for 2D/M-mode and ratios.

To add or delete measurement items:

1. To add a measurement item, roll the trackball to an item in the Selectable Label list and then press the **SET** key.
2. Roll the trackball to the **Add** button and then press the **SET** key.

   The item is placed at the end of the Measurement Item list.
3. To delete a measurement item, roll the trackball to an item in the Measurement Item list and then press the **SET** key.
4. Roll the trackball to the **Delete** button and then press the **SET** key.

   The item is placed at the end of the Selectable Label list.

To assign an author to a measurement item:

1. Roll the trackball to the **Author** field to the right of the Measurement Item and then press the **SET** key. If the field is blank, no selections are available.
2. Roll the trackball to highlight an author and then press the **SET** key.

   The author is now assigned to the measurement item.

To add all selectable labels assigned to the same author:

1. Under **Same Author Label All Selection**, roll the trackball to the author field and then press the **SET** key.
2. Roll the trackball to highlight an author and then press the **SET** key.
3. Roll the trackball to the **Add** button and then press the **SET** key.

   All selectable labels assigned to this author are added to the Measurement Item list.

To move between pages of measurement items:

1. Roll the trackball to the **Next** button and then press the **SET** key to access a higher page number.
2. Roll the trackball to the **Prev** button and then press the **SET** key to access a lower page number.

To select display of single or averaged measurements:

Note: This task cannot be performed with the Ratio tab.

1. For each measurement item, roll the trackball to the **Average** button (to display an average of all measurements) or the **Direct** button (to display the last measurement) and then press the **SET** key.
2. To change all measurement items on the same page, roll the trackball to the **Average** or **Direct** button in the **Parameter Selection All Label** section and then press the **SET** key.
3. Access each page of Measurement Items and repeat step 1 or 2.

To reset the Measurement Item list:

- Roll the trackball to the **Default** button and then press the **SET** key.

  All measurement items and author assignments are returned to factory default settings.

EFW/USMA Tab

Use this tab to select preferred authors for two EFW formulas. Both formulas display in the worksheet and the report. The EFW1 formula displays in the Measured Results when the required measurements have been made. You can also select an average USMA to be returned as measurements are made or specify that one of Hadlock's eleven regression equations be used.

For EFW1, EFW2, and USMA selections, the required measurements are listed in the associated Based Label box.

To make an EFW or USMA selection:

1. Roll the trackball to the appropriate **Author** field and then press the **SET** key.

   The system displays a pull-down menu of available authors or equations.

2. Roll the trackball to highlight an author or equation and then press the **SET** key.

Item & Reference Selection, Early OB

The Item & Reference Selections for Early OB closely parallel those for Standard OB. The 2D-Mode tab has fewer system-defined labels, sharing five user-defined labels with Standard OB. The Ratio tab has no system-defined ratios, but shares five user-defined ratio labels with Standard OB. The EFW/USMA tab is the same as for Standard OB.

Display Configuration, Standard OB/Early OB

The Standard OB/Early OB Display Configuration allows you to designate items to include on the measurement screen and in the worksheet and patient report.

Selection	Option(s)	Allows you to...
Measurement Screen		
Abbreviated Display of Results	On Off	Display in the Measured Results only labels to which measurement values have been assigned. De-select the check box to display all the measurement labels specified in the Item and Reference Selection.
HC with BPD/OFD measurement	On Off	Automatically derive values for BPD and OFD from the HC measurement.
AC with ATD/ASD measurement	On Off	Automatically derive values for ATD and ASD from the AC measurement.
Report/Worksheet		
Abbreviated Display of Results	On Off	Display in the 2D-Mode Measurements section of the report only labels to which measurement values have been assigned. De-select the check box to display all the measurement labels specified in the Item and Reference Selection.
Physician ID	On Off	Include at the bottom of the report page the Physician ID number entered in the Patient Data form.
Referring MD[1]**, Report Referring MD**[2]	On Off	Include at the bottom of the report page the Referring MD name entered in the Patient Data form.

[1] Requires software version 2.0 or higher

[2] For software versions below 2.0

Customize Growth Analysis Graphs, OB and Early OB

Use this selection to set up growth curves for OB and Early OB exams.

Selection	Option(s)	Allows you to...
Customize Growth Analysis Graph		
Graph Format	**Single** **Quad**	Select the number of growth graphs displayed on a page in the patient report. Select **Single** to display one graph to a patient report page. Select **Quad** to display four graphs to a page. With either option, each graph displays the growth curve for a different, user-selectable growth parameter according to a user-selectable reference (author).
Graph Display	**Current** **Previous**	Select the exam(s) from which growth data will be displayed in a growth graph. Select **Current** to display measurement values from the current exam only. Select **Previous** to display values from prior OB exams. **Previous** requires that the exams are available on the hard drive or CD drive and are linked to the current study. Select both check boxes to plot current measured results with previous measurements for a parameter on a single graph.
Graph Grid	On Off	Display vertical and horizontal lines on the graph.
AutoStore Report Data		
Report Data Auto Store	On Off	Save current exam data automatically when accessing a graph.

Standard OB/Early OB User-Defined Formulas

Access a Standard OB/Early OB formula with one of the following selections from the Standard OB or Early OB Measurement and Report screen:

- **EFW Formula**
- **Ratio Formula**
- **MA Data**
- **GA Data**

To access a formula screen:

1. Roll the trackball to any of these choices and then press the **SET** key.
2. For MA Data and GA Data, roll the trackball to the Formula button under Data Type and then press the **SET** key.

The resulting formula screens are very similar. Basic formula-building rules apply to EFW, Ratio, MA Data, and GA Data formulas. Use the following procedure for all four formula types.

To create a user-defined formula:

1. Roll the trackball to the drop-down box at the upper left corner and then press the **SET** key.

   The system displays a list of numbered User-Defined formulas.

2. Roll the trackball to highlight one of the User-Defined formula numbers and then press the **SET** key.
3. In the MA Data and GA Data screens, roll the trackball to the **Known Variable Label** field and then press the **SET** key. In the Ratio Formula screen, roll the trackball to the **Label Name** field and then press the **SET** key.

   The system displays a list of labels.

4. For these three screens, roll the trackball to highlight a label and then press the **SET** key.
5. For all screens, roll the trackball to the **Reference (Author)** field and then press the **SET** key.
6. Roll the trackball to highlight an author or use the keyboard to enter the name of an author and then press the **SET** key.
7. For all screens, roll the trackball to the first field in the **Range** section and then press the **SET** key.
8. For MA Data and GA Data screens, enter the lower limit for the measurement range in millimeters, and then use the tab key on the keyboard to move the cursor to enter millimeters for the upper limit.

9. For all screens, use the tab key to advance to the Date area.
10. Using the tab key between boxes, enter the week and day for the lower limit for the age range in the boxes at the left and the week and day for the upper limit in the boxes at the right.
11. For a Ratio formula screen, enter the minimum and maximum values for the ratio between the parentheses.
12. In the GA Data formula screen, roll the trackball to the **SD Type** field and then press the **SET** key.

    A list of standard deviation types displays.
13. Roll the trackball to highlight one of the SD types and then press the **SET** key.
14. In the Result Unit section of the MA Data formula screen, roll the trackball to the **Days** button for a standard deviations formula or the **Weeks** button for a standard formula and then press the **SET** key.
15. For MA Data, GA Data, and EFW formula screens, roll the trackball to the upper right corner to select a conventional formula or a standard deviation limits formula.
16. Enter your formula in the field to the right of the equals sign (=). Use the keyboard to enter numbers and any of the operators listed in the **Operation** box at the bottom of the screen. Use the trackball and the **SET** key to select constants (see below) and variables (or values). Example: "A"*LOG("BPD")+COS(ATD)-1.8327

    Note: You can use parentheses, but do not use spaces to separate elements in your formula. Do not delete any of the quote marks entered by the system. You can enter up to 64 characters in this field. To conserve space, you can assign a letter value to a constant and enter the letter into your formula instead of the full constant.

To define a constant for a user-defined formula:

Constant	
Label	**Value**
A	1.118303
B	

1. Roll the trackball to the Value column parallel with the label letter to which you want to assign the value and then press the **SET** key.

   The system displays an entry field next to the label letter.

2. Enter a numeric value of up to eight characters, including a decimal point if required, and then press the **SET** key.
3. To insert a constant into a formula, roll the trackball to position the pointer on the appropriate letter in the **Label** column and then press the **SET** key.

   The system inserts the label letter into the formula.

To delete a user-defined formula:

1. Roll the trackball to highlight one of the **User-Defined** numbers in the upper left of the screen.
2. Roll the trackball to the **Delete Current Reference** button and then press the **SET** key.

To exit a user-defined formula screen:

1. To exit and save the formula, roll the trackball to the **OK** button and then press the **SET** key.

   The system informs you if there is a syntax or other error in the formula. If necessary, resolve the problem and exit again.

2. To exit and not save the formula, roll the trackball to the **Cancel** button and then press the **SET** key.

   The system queries you to save changes by selecting **OK** or discard changes by selecting **Cancel**.

Standard OB/Early OB User-Defined Tables

Access a Standard OB/Early OB table with one of the following selections from the Standard OB or Early OB Measurement and Report screen:

- **MA Data**
- **GA Data**

To access a table screen:

1. Roll the trackball to one of these choices and then press the **SET** key.
2. Roll the trackball to the **Table** button under Data Type and then press the **SET** key.

The resulting table screens are very similar for MA Data and GA Data: basic table-building rules apply to both types. Use the following procedure for both table types.

To create a user-defined table:

1. Roll the trackball to the drop-down box at the upper left corner and then press the **SET** key.

   The system displays a list of numbered User-Defined tables.

2. Roll the trackball to highlight one of the User-Defined table numbers and then press the **SET** key.
3. Roll the trackball to the **Known Variable Label** field and then press the **SET** key.

   The system displays a list of labels.

4. Roll the trackball to highlight a label and then press the **SET** key.
5. Roll the trackball to the **Reference (Author)** field and then press the **SET** key.
6. Roll the trackball to highlight an author or use the keyboard to enter the name of an author and then press the **SET** key.
7. Roll the trackball to the first field in the **Range** section and then press the **SET** key.
8. Enter the lower limit for the measurement range in millimeters, and then use the tab key on the keyboard to move the cursor and enter the upper limit.
9. Use the tab key to advance to the Date area.
10. Using the tab key to move between boxes, enter the week and day for the lower limit of the age range in the boxes at the left and the week and day for the upper limit in the boxes at the right.

11. In the GA Data table screen, roll the trackball to the **SD Type** field and then press the **SET** key.

    The system displays a list of standard deviation types.

12. Roll the trackball to highlight one of the SD types and then press the **SET** key.
13. In the MA Data table screen, your result units of weeks and days are built into the table, so leave the default selection for the **Result Unit** field.
14. Create your table in the box. Use the tab key to move to each new field. Create additional lines by using the scroll bar.

    The first line should contain the lower limit for the variable value and the week and day for the lower limit of the date range. The last line should contain the upper limits. The table must contain an entry for every variable value between the upper and lower limits in order for the system to display a measured value in the worksheet and the patient report. For example, if you specify a range from 10.0 to 11.0, you must create a line entry for 10.0, 10.1, 10.2...11.0. If you only create entries for 10.0, 10.2, 10.4...11.0, a measured value of 10.3 will not display.

    Note: Measurements corresponding to table values that are outside the range will not be recognized. A measurement that is within the range but less than the lowest table value will only provide an MA or GA value equivalent to the lowest value. A measurement that is within the range but greater than the highest table value will only provide an MA or GA value equivalent to the highest value.

15. In the **Value** field, enter the size in mm that indicates a specific age.
16. In the **Weeks** and **Days** field, enter the age.
17. For MA tables, enter a number in the **SD Limits** field. The system converts the number to days for you, such as +/- 2 d.

    For GA tables, enter lower and upper limits for the value in the **Lo Limit** and **Up Limit** fields.

To delete a user-defined table:

1. Roll the trackball to highlight one of the **User-Defined** numbers in the upper left of the screen.
2. Roll the trackball to the **Delete Current Reference** button and then press the **SET** key.

To exit a user-defined table screen:

1. To exit and save the table, roll the trackball to the **OK** button and then press the **SET** key.

   The system informs you if there is an error in the table. Resolve the problem and exit again.

2. To exit and not save the table, roll the trackball to the **Cancel** button and then press the **SET** key.

   The system queries you to save changes by selecting **OK** or discard changes by selecting **Cancel**.

User-Defined Label, OB and Early OB

The OB and Early OB exams share five user-defined labels for 2D-mode. Access a user-defined label by selecting **Measurement Label** from the **Standard OB** or **Early OB Measurement and Report** screen.

Note: For user-defined labels to appear in the Measurement Menu, you must add them to the Measurement Order list using the **Item and Reference Selection** screen.

Measurement labels can be used in menstrual age tables, in formulas for estimating composite menstrual age and fetal weight, and in tables and formulas for growth analysis graphs.

To create a user-defined label:

1. Roll the trackball to the **User Defined** number field and then press the **SET** key.

   The system displays a list of five user-defined numbers.

2. Roll the trackball to highlight one of the User-Defined numbers and then press the **SET** key.
3. Roll the trackball to the **Label Name** field and then press the **SET** key.
4. Use the keyboard to type in a label name of up to eight characters.
5. Roll the trackball to the **Measurement Method** field and then press the **SET** key.

   The system displays a list of measurement methods.

6. Roll the trackball to highlight a method and then press the **SET** key.

   The system assigns the appropriate unit of measure for the method.

7. For additional 2D-mode labels, repeat steps 2 – 6.

To delete a user-defined label:

1. Roll the trackball to the **User Defined** number field in the 2D-mode section and then press the **SET** key.

   The system displays a list of five user-defined numbers.

2. Roll the trackball to highlight one of the User-Defined numbers and then press the **SET** key.
3. Roll the trackball to the **Delete Current 2D-Mode Label** button and then press the **SET** key.

Customizing Cardiac Measurements, Calculations, and Reports

The Measurement and Report Preset for the Cardiac exam includes generic and exam-specific descriptions.

Measurement and Report Preset	Description
Measurement Method	Refer to Measurement and Report Settings, page 3-25.
Customize General Measurement Menu	Refer to Measurement and Report Settings, page 3-27.
Measurement Order	Unique to the Cardiac exam – see page 3-47.
Display Item	Refer to Measurement and Report Settings, page 3-30.
Comments Library for Report	Refer to Measurement and Report Settings, page 3-31.

Measurement Order – Cardiac

There are two methods for making the Measurement Order selection for Cardiac exams. The method in effect depends on the selection made in the Heading field. Cubed, Teichholz, and Gibson selections are guided measurements for assessing left ventricular function. These selections require a special procedure to establish measurement order. Since one of these selections will display first when Measurement Order is selected, the Cubed, Teichholz, and Gibson selection procedure will be described here.

Note: If any other selection in the Heading field is made, follow the standard Measurement Order procedure. Refer to Measurement Order under Measurement and Report Settings, page 3-28.

The guided measurements present eight workflow patterns. Each pattern dictates a sequence of measurements. Select a pattern that best matches your workflow. Pattern 1 for each of the three guided measurement types includes all measurement labels. These measurements appear in the Measurement Order column on the right. Other patterns present the same sequence but with fewer measurements. Measurements not included in a pattern are listed in the Selectable Label column on the left. Measurements cannot be added, deleted, or rearranged for patterns.

To select a Cardiac guided measurement type:

1. Roll the trackball to the **Heading** field and then press the **SET** key.

   The system displays a pull-down menu of Cardiac measurement types.

2. Roll the trackball to highlight one of the first three selections: **Cubed(2D)**, **Teichholz(2D)**, or **Gibson(2D)**.

To select a Cardiac exam pattern:

1. Roll the trackball to the **Pattern** field and then press the **SET** key.

   The system displays a pull-down menu of pattern selections.

2. Roll the trackball to highlight a pattern and then press the **SET** key.

   The Measurement Order column displays the measurement sequence for this pattern.

3. Repeat step 2 until the system displays the pattern of labels you prefer in the Measurement Order column.
4. Roll the trackball to the **OK** button and then press the **SET** key.

Customizing Emergency Medicine, Calculations, and Reports

(Requires software version 2.0 or higher)

The Measurement and Report Preset for the Emergency Medicine exam includes generic and exam-specific descriptions.

Measurement and Report Preset	Description
Measurement Method	Refer to Measurement and Report Settings, page 3-25.
Customize General Measurement Menu	Refer to Measurement and Report Settings, page 3-27.
Calculation Item	Unique to the EM exam – see page 3-47.
Display Item	Refer to Measurement and Report Settings, page 3-30
Comments Library for Report	Refer to Measurement and Report Settings, page 3-31.

Calculation Item

Use this selection to select a reference author for OB measurement labels and one or two planes for measuring bladder volume.

Plane Selection	Allows you to...
Imaged transversely	Use measurements from the transverse plane.
Imaged sagitally	Use measurements from the sagittal plane.

To assign an OB reference author:

1. For each measurement label, roll the trackball to the arrow in the **Author** field and then press the **SET** key.

   The system displays a pull-down menu of reference authors for the measurement label.

2. Roll the trackball to highlight an author and then press the **SET** key.

   The system uses the selected reference author to determine an estimated menstrual age for measured results.

To reset labels back to factory default positions:

1. Roll the trackball to the **Default** button and then press the **SET** key.

   The system prompts you to confirm your choice.

2. Roll the trackball to the **OK** button and then press the **SET** key to continue.

To select planes for the Bladder Volume calculation:

- Roll the trackball to select one or both plane selections and then press the **SET** key.

4 Patient Data Management

Saving Patient Data

You can save patient data to the system's hard disk.

For software versions 2.0 and higher: The system indicates the quantity of stored images and clips on the lower left of the real-time imaging screen.

Indicator	Description
Img	Indicates the quantity of images stored for the current examination.
Clip	Indicates the quantity of clips stored for the current examination.

Saving Patient Registration Data

Use the patient data form to save patient registration data to the system's hard disk.

For software versions 2.0 and higher: Use the system presets to automatically store a screen representation of the completed patient data form to the registered patient's study.

F6

Patient ID
▶AutoStore New Patient Form

To save patient registration data:

- Register the patient.

  The system stores the patient data to the system's hard disk when you select the **OK** button at the bottom of the **New Patient Data** form.

Saving Images and Reports

You can save images and reports from the current examination to the system's hard disk.

[1] Instructions for Use

Configuring Documentation Controls Ch 4

The system automatically saves patient report data and a representative image of the report each time you save a patient report. The system retains only the most recently saved patient report data for each exam type.

To save an image:

1. Freeze the image.
2. Press the documentation control (**PRINT/STORE 1**, **PRINT/STORE 2**, or **DIGITAL STORE**) that is configured in the system presets for disk storage.

To save a displayed patient report:

- Press the documentation control (**PRINT/STORE 1**, **PRINT/STORE 2**, or **DIGITAL STORE**) that is configured in the system presets for disk storage.

Saving Clips

(Requires software version 2.0 or higher)

You can save (capture) a clip to the system's hard disk during a patient examination.

Clips are stored at 40 Hz during live imaging or at the acoustic frame rate (fps) during CINE.

To save (capture) a clip:

- Press the documentation control that is configured in the system presets for clip capture.

[1] Instructions for Use

Configuring Documentation Controls Ch 4
Configuring Clip Options Ch 4

Viewing Patient Data

You can view patient data that is stored on the system's hard disk or on the inserted CD.

Hiding Patient Information on the Screen

You can hide patient information on the screen.

Use the system presets to continuously hide or display patient information.

F6

Patient ID
▶Hide Patient
Demographic

To hide or display patient information on the screen (using a shortcut):

- Use the shortcut **Ctrl**+**P**: Press and hold the **Ctrl** key on the keyboard and then press the **P** key on the keyboard.

Accessing the DIMAQ-IP Screens

The DIMAQ-IP feature is an integrated workstation with comprehensive on-board image and data management capabilities.

The DIMAQ-IP feature includes the following screens:

- ***Image screen*** – Displays images for the currently selected study.

  Note: In this chapter, the term "Image screen" refers to a screen with the DIMAQ-IP option. In other chapters of the Operating Instructions, the use of "image screen" refers to a typical image screen that displays real-time images as they are acquired.

- ***Study screen*** – Lists studies that are saved on the selected disk (HD or CD).

[2] Instructions for Use

Example of typical "image screen" Ch A2

To access the DIMAQ-IP screens (Study screen and Image screen):

1. Press the **REVIEW** key on the control panel.

   If a patient is currently registered, then the system displays the Image screen. If there is not a patient currently registered, then the system displays the Study screen.

2. To display the Image screen (from the Study screen), select the **Image Screen** button on the left of the screen.
3. To display the Study screen (from the Image screen), select the **Study Screen** button on the left of the screen.

Selecting and Displaying Patient Data

You can select images and studies listed on the DIMAQ Image and Study screens. You can also sort, search for, and hide studies.

Selecting Images and Studies

To select…	Do this:
An image in the Image screen	Roll the trackball to position the pointer on the image and then press the **SET** key.
A study in the Study screen	Roll the trackball to position the pointer on the study and then press the **SET** key.
Multiple nonconsecutive studies in the Study screen	1. Select a single study. 2. For each additional study, roll the trackball to position the pointer on the study, press and hold the **Ctrl** key on the keyboard, press the **SET** key on the control panel, and then release the **Ctrl** key.
Multiple consecutive studies in the Study screen	1. Select a single study (the first study). 2. Roll the trackball to position the pointer on the last study in the series, press and hold the **Shift** key on the keyboard, press the **SET** key on the control panel, and then release the **Shift** key.

Sorting Studies

You can sort studies and resize the columns displayed in the Study screen.

To sort the studies displayed in the Study screen:

1. Select a column heading (such as **Patient Name** or **Images**).

   The system sorts the files in ascending order by the selected column header.

2. To sort the files in descending order, select the column heading again.

To resize columns displayed in the Study screen:

1. Roll the trackball over the rightmost vertical line of the column.
2. Press and hold the **SET** key on the control panel and then roll the trackball to the left or right until you achieve the desired column size.

Searching for Studies

You can search for studies stored on the hard disk or CD.

To search for a study:

1. Select the applicable option in the **Disk** section of the Study screen.
2. Select the **Search...** button on the right of the Study screen.

   The system displays the **Search…** dialog box.
3. Use the keyboard to enter partial or complete values for a patient last name or ID, or enter the study date or range of dates and then select **OK**.

   The system removes the **Search…** dialog box from the screen and updates the Study screen, listing only those studies that equal the entered values.
4. To display all studies on the disk (hard disk or CD), select the **Show All** button on the right of the Study screen.

   Note: The **Show All** button is available only after a search has been completed.

Hiding Studies

You can limit the display of studies to those newer than the selected age.

Note: This feature in not available for studies stored on CD.

To limit the display of studies:

1. Select the **Hide Studies** check box at the top of the Study screen.
2. Select the required age from the drop-down list to the right of the check box.

   The system displays studies newer than the selected age and indicates the number of studies displayed (and the total number of studies) on the upper left of the screen.

Viewing Images and Reports

You can change the display format for images and reports, delete images and reports, and use the slide show capability.

Scrolling Through Images and Reports

You can scroll through the images and reports displayed in the Image screen.

To scroll through the images displayed in the Image screen:

- Rotate the **SELECT** control.

Changing Display Formats

By default, the system optimizes the display format in the Image screen (layout format) to fit the number of images contained in the selected study. For example, if you select a study containing five images, the system displays the images in the **3 x 3** layout format.

In the full-screen display format, the selected image expands to the full size of the screen.

You can change the Image screen display (layout) format to display the selected number of images per page and lock the format for use when you display images from other studies. You can also toggle Image screen display format with full-screen display format.

To change the layout format for Image screen display of images:

- Select the required layout format from the drop-down list on the upper left of the Image screen.

To lock the selected layout format:

Lock graphic check box.

- Select the lock graphic check box on the upper left of the Image screen.

  The system retains the selected layout format until system shutdown.

To toggle Image screen display of an image with full-screen display:

Note: The term "double-click" refers to the action of rolling the trackball to position the trackball pointer on the object and then pressing the **SET** key on the control panel twice in quick succession.

- Either press the **SELECT** control or double-click the image.

  The system displays the image in full-screen display.

Limiting Display to Selected Images

(Requires software version 2.0 or higher)

You can select (mark) images out of sequence and then limit the display of images to these marked images.

Check mark indicates marked image.

The system indicates each marked image by placing a check mark on the lower right of the image. During simultaneous display of the marked images, the system displays a check box on the upper left of the Image screen.

Check box indicates that display is limited to marked images.

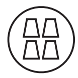
The system retains the check marks until you exit the Image screen.

To select images for simultaneous display:

1. For each image, roll the trackball to position the pointer over the image, press the **SET** key on the control panel to select the image, and then press the **L/R FLIP** key on the control panel to mark the image for simultaneous display.

L/R FLIP.

2. To cancel selection (marking) of an image, roll the trackball to position the pointer over the image and then press the **L/R FLIP** key again.
3. Press the **4B** key on the control panel to simultaneously display all the marked images.



4B.

4. To exit simultaneous display of marked images, press the **4B** key again.

Using the Slide Show Capability (Sequentially Viewing Images)

You can configure sequential viewing (slide show capability) of images displayed on the Image screen.

For software versions 2.0 and higher: The configuration includes the length of display for images. You can also specify the number of times each clip is played back.

For software versions below 2.0:

To sequentially view images in the currently displayed study:

- Select the **Slideshow** check box on the upper left of the Image screen and then select the full-screen display format (**1 x 1**).

For software versions 2.0 and higher:

To configure images for sequential viewing in the currently displayed study:

Note: The term "double-click" refers to the action of rolling the trackball to position the trackball pointer on the object and then pressing the **SET** key on the control panel twice in quick succession.

1. Select the **Options** button located on the left of the (DIMAQ) Image screen.
2. Select the **Slideshow on** check box.
3. To define the length of display for each image, use the keyboard to enter the time (in seconds, to the hundredth place) in the **Image Period (sec)** text box.
4. To specify the number of times each clip is played back, use the keyboard to enter the number in the **Clip Play Loop** text box.
5. Select **OK**.

   The system redisplays the (DIMAQ) Image screen.
6. Double-click an image or clip to view the slide show using a full-screen display format.

Deleting Images and Reports

You can delete images and reports from studies that are stored on the system's hard disk.

To delete an image or report from a study stored on the system's hard disk:

1. Select **HD** from the **Disk** section of the Study screen.
2. Select the required study (or studies) from the Study screen and then select the **Image Screen** button on the left of the screen.

   The system displays the study's images and reports on the Image screen.

3. Select an image or report.

   The system outlines the selected image or report.

4. Select the **Delete** button on the upper left of the screen and then select the **Yes** button in the confirmation message box displayed by the system.

Making Measurements on Stored Images

You can make measurements on images from the current examination. You can also store or print the image with the measurements.

Use the system presets to enable the system to save measurements on stored images.

Note: The system can save measurements performed on a stored image from the current study only.

F6

Storage
▶Image with Caliper

To make measurements on a displayed image for the current study:

Note: The term "double-click" refers to the action of rolling the trackball to position the trackball pointer on the object and then pressing the **SET** key on the control panel twice in quick succession.

1. Press the documentation key that is configured in the system presets for disk storage.

   The system saves the image to the system's hard disk and copies the image to the Image screen.

[2] Instructions for Use

Measurements and Calculations Ch B1

2. Press the **REVIEW** key on the control panel.

   The system displays the Image screen.

3. From the Image screen, double-click an image for full-screen display.
4. Press the **CALIPER** key to activate the measurement function and then perform the required measurements.

   You can assign measurement labels to images.

5. Press the documentation key configured in the system presets for disk storage or DICOM printing.

   The system saves the image with measurements as a new image on the system's hard disk and displays the image in the Image screen. If the documentation key used is configured for DICOM printing, the system also sends the image to the printer layout page.

6. To display the patient report, press the **F2** key or select the **Report** button from the Measurement menu.
7. To remove the patient report from the screen, select the **Return** button on the lower right of the patient report or press the **ESCAPE** key on the control panel.
8. To exit the measurement function and display the live image screen, press the **ESCAPE** key on the control panel twice.

   Note: You can use DIMAQ-IP to store or print the image with measurements to a DICOM device.

Note: Labeled measurements (such as **HC**, or head circumference) and the following measurement menu selections are not supported on accessed images: **PI Auto**, **Point Values**, and **Average Values**.

When unsupported measurements are designated for system presets as listed below, the system uses substitute supported measurements.

System Presets Selection	Unsupported System Presets Measurement Option	Designated Substitute Measurement Option
Caliper Default Position	**Depth**	**Center**

Playing Back Clips

(Requires software version 2.0 or higher)

You can play back a clip during a patient examination or from completed and saved studies. The playback speed is adjustable. You can also review a clip frame by frame and scroll through images displayed in the Image screen.

The system indicates the location of the currently displayed frame using the bar on the slider control displayed on the lower right of the Image screen.

To play back a clip during a patient examination:

1. Press the **REVIEW** key on the control panel.

   The system displays the image(s) (including any clips) on the Image screen. The system indicates image selection by outlining the selected image. The last image acquired (the last image on the last page) is automatically selected. When the selected image is a clip, the system automatically plays it back.

2. Select the clip either by using the trackball and **SET** key or by rotating the **SELECT** control.

   The system automatically plays back the selected clip.

3. To stop or start playback motion, choose a method:
   - Press the **FREEZE** key on the control panel.
   - Use the trackball and **SET** key to select the clip again. (In full-screen display, press the **SET** key.)
   - Use the clip control buttons at the bottom of the Image screen.

4. To adjust clip playback speed, use the **Clip Speed** slider control on the lower left of the Image screen.

System Reference

Changing Display Formats 4-8
Searching for Studies 4-7

To play back a clip from a completed study that is saved to the system's hard disk or to a CD:

1. Press the **F6** key on the control panel to display the Study screen.
2. If the clip is stored on a CD, then insert the CD containing the clip into the CD drive and select the **Load** button in the **CD** section of the Study screen to close the CD tray.
3. Select the required disk (**HD** or **CD**) in the **Disk** section of the Study screen.
4. Select the study and then select the **Image Screen** button.

   The system displays the image(s) (including any clips) on the Image screen. The system indicates image selection by outlining the selected image. The last image acquired (the last image on the last page) is automatically selected. When the selected image is a clip, the system automatically plays it back.

5. Select the clip either by using the trackball and **SET** key or by rotating the **SELECT** control.

   The system automatically plays back the selected clip.

   ◀◀ *Displays the previous frame.*

   ▶▶ *Displays the next frame.*

6. To stop or start playback motion, choose a method:
   – Press the **FREEZE** key on the control panel.
   – Use the trackball and **SET** key to select the clip again. (In full-screen display, press the **SET** key.)
   – Use the clip control buttons at the bottom of the Image screen.
7. To adjust clip playback speed, use the **Clip Speed** slider control on the lower left of the image screen.

To review a clip frame by frame:

- In Image screen display format, stop the playback motion and then select the appropriate clip control button at the bottom of the Image screen for display of the desired frame (previous frame or next frame).
- In full-screen display, stop the playback motion and then slowly roll the trackball to the right or left.

◀◀ *Displays the previous frame.*

▶▶ *Displays the next frame.*

To scroll through the images displayed on the Image screen:

- Rotate the **SELECT** control.

Enabling Simultaneous Clip Playback

(Requires software version 2.0 or higher)

You can enable simultaneous clip playback of all clips displayed in the (DIMAQ) Image screen.

To enable simultaneous playback of all clips within the currently displayed study:

1. Select the **Options** button located on the left of the (DIMAQ) Image screen.

   The system displays the **Options** dialog box.

2. Select **Play All Clips**.
3. Select **OK** to save changes and close the **Options** dialog box.

   The system redisplays the (DIMAQ) Image screen with clips simultaneously in motion.

4. To disable simultaneous playback, reselect the **Options** button, select **Play Only Selected Clip**, and then select **OK**.

Saving Frames from Clips

(Requires software version 2.0 or higher)

You can display a clip from the current study and then save one of the clip frames as a separate image in the study.

Note: Clip frames from previous studies cannot be saved.

[1] Instructions for Use

Configuring Documentation Controls Ch 4

To save a clip frame from the current study:

Note: The term "double-click" refers to the action of rolling the trackball to position the trackball pointer on the object and then pressing the **SET** key on the control panel twice in quick succession.

1. Press the **REVIEW** key on the control panel.

   The system displays the image(s) (including any clips) on the Image screen. The system indicates image selection by outlining the selected image. The last image acquired (the last image on the last page) is automatically selected.

2. Select (click) the clip.
3. Either double-click the clip or press the **SELECT** control.

   The system displays the clip in full-screen format.

4. Press the **SET** key to stop the playback motion and then roll the trackball to display the required frame.
5. Press the documentation control that is configured in the system presets for disk storage.

   The system saves the displayed clip frame as a separate image in the study.

Managing Patient Data

You can transfer studies that are located on the system's hard disk or inserted CD. You can also delete studies from the system's hard disk.

Transferring Studies

Using DIMAQ-IP's Study screen, you can archive studies onto CD. You can finalize CDs to prevent subsequent storage of studies and to make CDs readable by other CD drives. You can also import (copy) studies from CD to the system's hard disk.

Note: DICOM-formatted data cannot be imported from CD to the system's hard disk. If you plan to reimport data that you are archiving onto a CD, then select the **Tiff/AVI** check box to archive Tiff-formatted images and AVI-formatted clips.

To archive a study onto a CD:

1. Press the **REVIEW** key on the control panel to display the Study screen.
2. If the system displays the Image screen, then select the **Study Screen** button to display the Study screen.

   The system displays the Study screen.
3. Ensure that **HD** is selected in the **Disk** section of the Study screen.
4. Insert the CD into the CD drive and then select the **Load** button in the **CD** section of the Study screen to close the CD tray.
5. Select a single study (or multiple studies) and then select **Export** in the **CD** section of the Study screen.

   The system copies the selected study or studies to the inserted CD and updates the study's **Archived** status to **CD**.
6. To finalize the inserted CD:

   a. Select the **Finalize** button in the **CD** section of the Study screen and then select **OK** to confirm the operation.

      The system displays a message indicating that finalization of the CD is complete.

   b. Select **OK** to remove the message from the screen.

To copy a study from the inserted CD to the system's hard disk:

1. Press the **REVIEW** key on the control panel to display the Study screen.
2. If the system displays the Image screen, then select the **Study Screen** button to display the Study screen.

   The system displays the Study screen.
3. Insert the CD into the CD drive and then select the **Load** button in the **CD** section of the Study screen to close the CD tray.
4. Ensure that **CD** is selected in the **Disk** section of the Study screen.
5. Select a single study (or multiple studies) and then select **Import** in the **CD** section of the Study screen.

   The system copies the selected study or studies to the system's hard disk. When you select **HD** in the **Disk** section to display studies saved on the system's hard disk, the **Archived** status of the imported study is listed as **Import**.

Recording Stored Images

(Requires software version 2.0 or higher)

You can record stored images from the DIMAQ Image screen to videotape.

Note: Use the slideshow capability to record all images in a study.

System Reference

Recording Patient Data Ch 5

Using the Slideshow Capability 4-10

Deleting Studies

You can remove studies from the system's hard disk.

Note: Studies on a CD cannot be deleted using the DIMAQ-IP Study screen. Also, you cannot delete the current study.

To delete a study from the system's hard disk:

1. Select **HD** from the **Disk** section of the Study screen.
2. Select a single study (or multiple studies) in the Study screen and then select **Delete**.

   The system removes the study or studies from the system's hard disk.

System Management of Studies on the Hard Disk

A warning message displays at system start-up if the hard disk is nearly full. If the hard disk is 70 percent full, the system indicates that unarchived studies may soon be deleted. If the hard disk is 80 percent full, the system indicates that unarchived studies will be immediately deleted.

When the hard disk reaches 70 percent capacity while the system is running, the system automatically deletes all studies older than 48 hours that are archived.

Optimizing System Performance (Hard Disk Defragmentation)

(Requires software version 2.0 or higher)

You can optimize system performance by routinely defragmenting the system's hard disk to increase efficient disk space.

To defragment the system's hard disk:

⚠ **Caution:** To avoid damage to the data on the ultrasound system's hard disk, you must follow this defragmentation procedure.

1. Press the **F6** key on the keyboard to display the **Preset Main Menu** and then select **DIMAQ Utility** on the left of the screen.
2. Select the **Defrag Now** button at the top of the screen.

   The system displays the **Disk Defragmenter** screen.
3. Select the **Defragment** button at the bottom of the dialog box.

   The system indicates that defragmentation is occurring and then displays a message indicating that defragmentation is complete.
4. Select the **Close** button to remove the message from the screen.

   The system redisplays the **Disk Defragmenter** screen.
5. Select the **X** on the upper right of the screen to exit the **Disk Defragmenter** screen.

   The system redisplays the **DIMAQ Utility** screen.
6. Press the **F6** key on the keyboard to exit the **DIMAQ Utility** screen.

F6

DIMAQ Utility

Protecting Patient Data

You can activate password protection of patient data accessed using DIMAQ screens. You can also change the password.

When you activate password protection, the system requires entry of the password the first time you access a DIMAQ screen after powering on the system. You can reactivate password protection after accessing patient data.

Use the system presets to activate password protection of patient data and to change the password.

F6

DIMAQ Utility

To activate password protection of patient data:

1. Press the **F6** key on the keyboard to display the **Preset Main Menu** and then select **DIMAQ Utility** on the left of the screen.
2. To create a password or to change the existing password:
   a. Select the **Password** button in the **DIMAQ Study Access** section of the screen.

      The system displays a dialog box for entry of the password. If a password exists, then you must also enter the existing password.

   b. Use the keyboard to enter the existing and/or new passwords in each field as indicated and then select **OK** to exit the dialog box.
3. Select **Enable for Password Protection** in the **DIMAQ Study Access** section of the screen.

   The system displays a dialog box for entry of the password.

4. Use the keyboard to enter the existing password, select **OK** to exit the dialog box, and then select **OK** to confirm the operation.
5. To save changes and exit the **DIMAQ Utility** screen:
   – For software versions 2.0 and higher: Select the **Save** button at the bottom of the screen.
   – For software versions below 2.0: Select the **OK** button at the bottom of the screen.

To reactivate password protection of patient data:

1. Press the **F6** key on the keyboard to display the **Preset Main Menu** and then select **DIMAQ Utility** on the left of the screen.
2. Select the **Lock DIMAQ** button in the **DIMAQ Study Access** section of the screen and then select **OK** to confirm the operation.
3. To save changes and exit the **DIMAQ Utility** screen:
   - For software versions 2.0 and higher: Select the **Save** button at the bottom of the screen.
   - For software versions below 2.0: Select the **OK** button at the bottom of the screen.

To create a password or change the existing password:

1. Press the **F6** key on the keyboard to display the **Preset Main Menu** and then select **DIMAQ Utility** on the left of the screen.
2. Select the **Password** button in the **DIMAQ Study Access** section of the screen.

   The system displays a dialog box for entry of the password. If a password exists, then you must also enter the existing password.
3. Use the keyboard to enter the existing and/or new passwords in each field as indicated and then select **OK** to exit the dialog box.
4. To save changes and exit the **DIMAQ Utility** screen:
   - For software versions 2.0 and higher: Select the **Save** button at the bottom of the screen.
   - For software versions below 2.0: Select the **OK** button at the bottom of the screen.

Files Saved to CDs

Compact disks (CDs) may contain the file types listed below.

Patient folders are labeled by the related patient ID. Study folders are labeled with the date and time of the study, using the date format *MM.DD.YYYY*, where *YYYY* is the year, *MM* is the month, and *DD* is the day, and the time format *HH.MM.SS*, where *HH* is the hour, *MM* is the minute, and *SS* is the second. The date format used to name the study folders is unrelated to the date format set in the system presets.

Note: DICOM-formatted files are stored in the DICOM directory on the CD. Patient data for each file is identified when viewed using a DICOM viewing tool.

Extension	File name*	Data Included in File	Location (within the siemens/studies folder)
.AVI	*<ID>_<date><time>_<#>*	Clip that was saved to the CD.	**clips** folder within the study folder, within the ID-labeled patient folder
.CAL	*<ID>_<date><time>_<#>*	Image display parameters for the image file (.TIF) with an identical file name.	**images** folder** within the study folder, within the ID-labeled patient folder
.DAT	Archive	Archival status of the related study.	study folder within the ID-labeled patient folder
.DAT	Study	Patient data for a specific study that was saved to the CD.	study folder within the ID-labeled patient folder
.REP	*<ID><date><exam type>*	Patient report data for a patient report that was saved to the CD.	**reports** folder within the study folder, within the ID-labeled patient folder
.SCALE	*<ID>_<date><time>_<#>*	N/A—not used.	**images** folder** within the study folder, within the ID-labeled patient folder
.TIF	*<ID>_<date><time>_<#>*	Image that was saved to the CD or image of patient report that was saved to the CD.	**images** folder** within the study folder, within the ID-labeled patient folder

** Terms in italic type and in carets (<>) indicate information used to name the file. The date format is YYYYMMDD for .REP files and MM.DD.YYYY for all other files, where YYYY is the year, MM is the month, and DD is the day (this date format is unrelated to the date format set in the system presets). The time format for all files is HH.MM.SS, where HH is the hour, MM is the minute, and SS is the second. The number sign (#) is a counter used to facilitate searching for images. The counter increments one unit for each image saved.*

***Disregard the contents of the folders within the images folder. These contents are used only when viewing images and reports on the ultrasound system.*

Specifying the Write Speed for the CD Drive

You can specify the write speed for the CD drive on the ultrasound system.

To specify the write speed for the CD drive:

1. Press the **F6** key on the keyboard to display the **Preset Main Menu** and then select **DIMAQ Utility** on the left of the screen.
2. Select the speed from the **Write speed** drop-down list in the **CDR** section of the screen.
3. To save changes and exit the **DIMAQ Utility** screen:
   - For software versions 2.0 and higher: Select the **Save** button at the bottom of the screen.
   - For software versions below 2.0: Select the **OK** button at the bottom of the screen.

5 Documentation Devices

Using the CD Drive

To insert a CD into the CD drive on the ultrasound system:

1. Press the **REVIEW** key on the control panel to display the Study screen.
2. If the system displays the Image screen, then select the **Study Screen** button to display the Study screen.
3. Select the **Eject** button in the **CD** section of the Study screen.

   The system ejects the CD tray.
4. Place the CD onto the CD tray.
5. Select the **Load** button in the **CD** section of the Study screen.

   The system closes the CD tray and reads the CD.

To eject an inserted CD:

1. Press the **REVIEW** key on the control panel to display the Study screen.
2. If the system displays the Image screen, then select the **Study Screen** button to display the Study screen.
3. Select the **Eject** button in the **CD** section of the Study screen.

   The system ejects the CD tray.
4. Remove the CD from the CD tray.
5. Select the **Load** button in the **CD** section of the Study screen.

   The system closes the CD tray.

Formatting CDs

You can format CDs before use.

To format the inserted CD:

1. Display the **Preset/QuickSet Utility** screen.
2. Select **CD-R/RW** from the drop-down list on the lower left of the **Preset/QuickSet Utility** screen to display the **Format** button.
3. Select the **Format** button at the bottom of the screen.

   The system displays the **CD-RW Format** dialog box.
4. To specify quick formatting, select the **Quick Format** check box.
5. Select **OK** to begin formatting the CD.

   The system removes the **CD-RW Format** dialog box from the screen, formats the CD, and then displays a status message.
6. Select **OK** to exit the status message.

Storing and Retrieving System Presets and QuickSets

You can save user-defined QuickSets and system presets to a CD and then retrieve the files as needed.The system saves each QuickSet to an individual QuickSet file and each type of system presets to an individual Preset file.You can retrieve one Preset file at a time.

On the **Preset/QuickSet Utility** screen, the system lists the contents stored to the selected location (system's hard disk or CD).The system organizes Preset files by file name and file type and QuickSet files by name, exam, and transducer.When the contents of the CD are displayed, the system also lists the date and time of storage for each Preset file and QuickSet file.

Note: The date and time for Preset files stored on the system's hard disk do not match the date and time for Preset files stored on CD (which represent the actual time of storage).When you display the **Preset/QuickSet Utility** screen and select the contents of the system's hard disk for display, the system updates the date and time included in the Preset file names stored on the system's hard disk.

System Reference

System Presets	Ch 3
Formatting CDs	5-3
Preset File Type Descriptions	5-7

[2] Instructions for Use

Creating a QuickSet	Ch A1

To display the Preset/QuickSet Utility screen, choose one of the following methods:

- Press the **F6** key on the keyboard to access the system presets and then select **Preset/QuickSet Utility** on the left of the screen.
- Press the **F8** key on the keyboard to access the **Save/Delete QuickSet** screen and then select the **Preset/QuickSet Utility** button on the lower left of the screen.

To save Presets and/or QuickSets to the inserted CD:

1. Display the **Preset/QuickSet Utility** screen.
2. Select **System** from the drop-down list on the lower left of the **Preset/QuickSet Utility** screen to display the contents of the system's hard disk.
3. To sort the displayed Preset files or QuickSet files, select the required column heading.
4. Select Preset(s) and/or QuickSet(s) for storage by selecting the check box to the left of each Preset and/or QuickSet.
5. Select the required write speed from the **CD-R/RW Write Speed** drop-down list on the upper right of the **Preset/QuickSet Utility** screen.
6. Select the **Export** button and confirm the storage operation; if overwriting, confirm the overwrite operation.

   The system stores the selected Presets and QuickSets to the CD and then displays a status message.

7. Select **OK** to exit the status message.

   The system ejects and then re-inserts the CD.

8. To close the **Preset/QuickSet Utility** screen, select the **Exit** button on the lower right of the screen.

To retrieve a Preset and/or QuickSet(s) from the inserted CD:

Note: When you retrieve a Preset, the system overwrites related settings in the system presets.When you retrieve a QuickSet, the system overwrites any existing QuickSet that has the same name.

1. Display the **Preset/QuickSet Utility** screen.
2. Select **CD-R/RW** from the drop-down list on the lower left of the **Preset/QuickSet Utility** screen to display the contents of the inserted CD.
3. To update the displayed list of files, select the **Update** button at the bottom of the screen.
4. To sort the displayed Preset files or QuickSet files, select the required column heading.
5. To select a Preset for retrieval:
    a. Select the required file type from the **File Type** drop-down box on the upper right of the screen.

       The system displays all Preset files of the selected type that are currently saved on the CD.

    b. Select the required file.

       The system highlights the selected file.
6. To select QuickSet(s) for retrieval, select the check box to the left of each required QuickSet file.
7. Select the **Import** button; if required, confirm the operation.

   If you retrieved Preset(s), then the system displays a message indicating that a system reboot is required.
8. Select **OK** to confirm the displayed reboot operation message, if displayed.

   The system reboots (cycles power).
9. If you retrieved QuickSet(s) only, then select the **Exit** button on the lower right of the screen to close the **Preset/QuickSet Utility** screen.

Preset File Type Descriptions

Each Preset file type saves a specific set of system preset settings.

Preset File Type	Settings Saved
General System Presets	Settings under the following system preset menu items: ▪ **General** ▪ **Day/Time** (except for **Date** and **Time**) ▪ **Patient ID** ▪ **Imaging** ▪ **Peripheral** ▪ **Customize Keys** ▪ **Boot Up** (except for **Bootup Exam**, which is saved with the **Default Settings** Preset file type) ▪ **Storage** ▪ **Display** ▪ **ReadySet** ▪ **M&R** (**General Caliper** setting only) ▪ **System/Language** (**Select Language** setting only)
OB Tables and Formulas	All user-defined formulas and tables plus the items and references for the Obstetric measurements and reports package (under the **M&R** system preset menu item).
Default Settings	Settings under the following system preset menu items: ▪ **Boot Up** (**Bootup Exam** setting only) ▪ **Default Settings** ▪ **User-Defined Exam List** ▪ **M&R** (**Measurement and Report Preset** settings only, for all exam types)
Network Settings	Settings under the following system preset menu items: ▪ **DICOM** ▪ **Networking**
Total System Configuration	All settings that are saved for the following Preset file types: ▪ **General System Presets** Preset file type ▪ **OB Tables and Formulas** Preset file type ▪ **Default Settings** Preset file type

F6

M&R
▶Measurement and Report Preset
▶▶Standard OB/ Early OB User-Defined
▶▶Item & Reference Selection

Video Cassette Recorders

⚠ **Caution:** When the ultrasound system is expecting a video signal from a connected input/output device, a bright band displays on the screen.The screen saver on the ultrasound system does not replace this bright band.To avoid permanent damage to the screen (phosphorus burn-in), return the system to an imaging display before leaving the monitor unattended.

Note: Please refer to the manufacturer's user manual for instructions on operating your VCR.

Note: While the ultrasound system is designed to provide the highest quality of images to a documentation or storage device, image quality during playback is dependent on the VCR and video tape being used.Always use an S-VHS videotape.

VCR Communication Set Up

Connect the VCR cables to the "Y/C Video" ports on the Input/Output panel of the ultrasound system.

Use the system presets to designate the video input port on the ultrasound system that is connected to the VCR cables.

F6

Peripheral
▶Video Input Source

To designate which video input port is connected to the VCR cables:

1. Press the **F6** key on the keyboard to access the system presets.

   The system displays the **Preset Main Menu** screen.

2. Select **Peripheral** on the left of the screen.
3. Select **S-VHS** for **Video Input Source**.
4. Select the **Save** button to store the new settings and exit the system presets.

Recording Patient Data

Standard video signals are provided in PAL and NTSC formats.If you plan to make measurements on the recorded data, then configure the system to display the ***playback code***.The playback code is the encoded image information required for measurements on recorded data.

For software versions 2.0 and higher: You can record stored images from the DIMAQ Image screen to videotape.

Use the system presets to display the playback code.

F6

Display
▶Playback Code

To display the playback code:

1. Press the **F6** key on the keyboard to access the system presets.

   The system displays the **Preset Main Menu** screen.

2. Select **Display** on the left of the screen.
3. Select **On** for **Playback Code**.
4. Select the **Save** button to store the new settings and exit the system presets.

To record patient data using a VCR:

Note: For software versions 2.0 and higher: Use the slide show capability to record all images in a study.

System Reference

Using the Slide Show Capability Ch 4

- Insert a videocassette into the VCR and then use the VCR controls to begin recording.

Using Video Playback

During video playback, an image can be paused and then printed through a connected printing device.

To play back a recorded image:

1. Insert a videocassette into the VCR and then press the **VIDEO I/O** key on the keyboard.

   Communication between the VCR and the imaging system is opened.

2. Use the VCR controls to play back the recorded image.
3. To discontinue communication between the VCR and the ultrasound system and resume real-time imaging, press **VIDEO I/O** again.

Making Measurements on Recorded Data

You can make measurements on recorded examination data and view subsequent patient report data if the playback code was displayed when the data was recorded.

Note: To keep a record of measurements or patient report data, print the image or patient report.

Note: The following measurements are not supported on recorded examination data: **PI Auto**, **Point Values**, and **Average Values**.

When unsupported measurements are designated for system presets as listed below, the system uses substitute supported measurements.

System Presets Selection	Unsupported System Presets Measurement Option	Designated Substitute Measurement Option
Caliper Default Position	**Depth**	**Center**

System Reference

Displaying the playback code 5-9
Playing back recorded data 5-9

To make measurements on recorded examination data:

Note: To change the patient information (other than patient ID) previously entered into the **Playback Caliper** dialog box for measurements on a videotape, first close and re-open communication between the VCR and the imaging system by pressing the **VIDEO I/O** key on the keyboard twice.

1. Before opening communication between the VCR and the imaging system, press the **F5** key on the keyboard to select the exam type for the measurements you want to make.For example, if you want to make obstetric measurements, press the **F5** key and then select **OB**.
2. Insert a videotape into the VCR and then press the **VIDEO I/O** key on the keyboard.

   Communication between the VCR and the imaging system is opened.
3. Play back the recorded data and then use the VCR controls to pause playback when the required image is displayed.
4. Press the **CALIPER** key on the control panel.

   The system displays the **Playback Caliper** dialog box, with text boxes specific to the selected exam type.
5. Enter the following required information into the dialog box:
   – Playback code (which is displayed at the bottom of the screen) into the **Playback Code** textbox.
   – Date of the patient examination into the **Study Date** text box.

[1] Instructions for Use

Changing the Exam Type Ch 5

6. Enter other information into the dialog box as required.
7. Select the **OK** button on the dialog box.

   The system removes the **Playback Caliper** dialog box from the screen and displays the measurement options applicable to the selected exam type.
8. Make measurements as required.
9. To view patient report data when available, select the **Report** selection on the left of the screen while measurements are active.
10. To exit the measurement function, press the **ESCAPE** key on the control panel.

System Reference

Printing Images and Patient Reports 5-12

Printers

You can print images from a current examination, a patient report, CINE data, or an image retrieved from a disk or videotape.

Note: Refer to the manufacturer's user manual for proper handling and operating instructions of the printer installed on your ultrasound system.

Report Printers

⚠ **WARNING:** Accessory equipment connected to the analog and digital interfaces must be certified according to the respective EN and IEC standards (for example, EN 60950 and IEC 60950 for data processing equipment and EN 60601-1 and IEC 60601-1 for medical equipment).Furthermore, all configurations shall comply with the system standards EN 60601-1-1 and IEC 60601-1-1.Anyone who connects additional equipment to the signal input or signal output port configures a medical system and is therefore responsible that the system complies with the requirements of the system standards EN 60601-1-1 and IEC 60601-1-1.Siemens can only guarantee the performance and safety of the devices listed in the *System Reference*.If in doubt, consult Siemens service department or your local Siemens representative.

System Reference

Accessories and Options Ch 2

⚠ **WARNING:** Equipment connected to the ultrasound system and in the patient environment must be powered from a medically-isolated power source or must be a medically-isolated device.Equipment powered from a non-isolated source can result in chassis leakage currents exceeding safe levels.Chassis leakage current created by an accessory or device connected to a non-isolated outlet may add to the chassis leakage current of the ultrasound system.

⚠ **WARNING:** Non-medical grade report printers cannot be used within a patient environment.

⚠ **WARNING:** During use of a non-medical grade report printer or when a non-medical grade report printer is connected to the ultrasound system, the ultrasound system cannot in any way be in contact with a patient.

Relevant standards for some non-medical electrical equipment may have limits for enclosure leakage currents higher than required by medical standards.These higher standards are acceptable only outside the patient environment.It is essential to reduce enclosure leakage currents when non-medical electrical equipment is to be used within the patient environment.Measures for reducing leakage current include use of a medically-approved isolation transformer.

The ultrasound system has printer drivers compatible with non-medical grade report printers.Siemens does not guarantee the performance and safety of any non-medical grade report printer.Non-medical grade report printers do not fulfill the following safety requirements:

- EN 60601-1-1 and IEC 60601-1-1 (Medical Electrical Equipment, Part 1: General Requirements for Safety).
- EN 60601-1-2 and IEC 60601-1-2 (Electromagnetic Compatibility of Medical Devices).

If a non-medical grade report printer is to be used with the ultrasound system, then you must ensure mitigation is provided to meet all safety requirements.It is the responsibility of the user to ensure that the ultrasound system in combination with the non-medical grade report printer complies with safety requirements.

- Always use a medically-approved isolation transformer with a non-medical grade report printer.
- Mitigate risk with regard to the Electromagnetic Compatibility of Medical Devices requirement.A non-medical grade device must be designed, manufactured, and certified to meet the same EMC (electromagnetic compatibility) requirements as the ultrasound system, or other means must ensure that the overall EMC requirements are met.

Manufacturers of Medically-Approved Isolation Transformers

Manufacturer	Web Site
Tripp Lite	www.tripplite.com
Toroid Corporation of Maryland	www.toroid.com
Dale Technology Inc.	www.daletech.com

Mitigating the Risk of Connecting a Report Printer

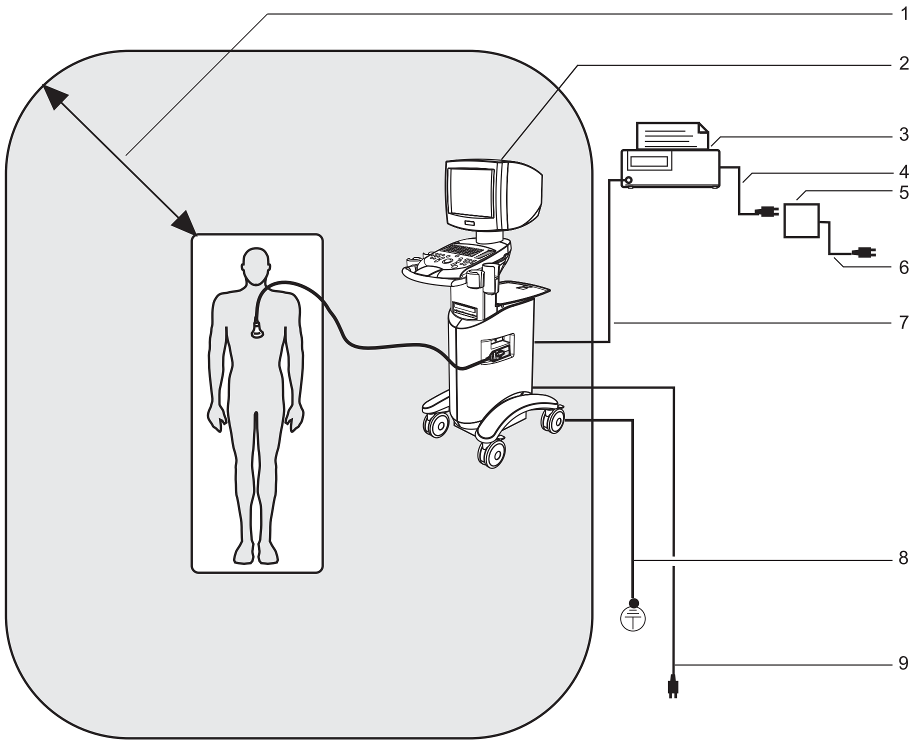
To fulfill EN 60601-1-1 and IEC 60601-1-1 (Medical Electrical Equipment, Part 1: General Requirements for Safety) requirements for non-medical peripheral equipment:

- The non-medical peripheral equipment must be approved according to any other EN or IEC standard (EN XXXXX or IEC XXXXX, e.g., equipment complying with EN 60348 and IEC 60348, EN 60950 and IEC 60950, etc.).
- The connection of non-medical peripheral equipment to your ultrasound system must adhere to the following conditions:
  1. Connect the ultrasound system to an AC power outlet within a medically used room within the patient environment.A patient environment is defined as an area in which medical examination, monitoring, or treatment of the patient takes place.The patient environment is located 1.5 meters (1.8 meters [6 feet] in Canada and the U.S.A.) around the patient location.
  2. Connect the peripheral equipment AC power cable to medically approved isolation transformer.
  3. Connect the medically approved isolation transformer to a main AC outlet either inside or outside the patient environment.The peripheral device and medically approved isolation transformer combination can be either (a) within the same room as the ultrasound system, or (b) in a non-medically used room.

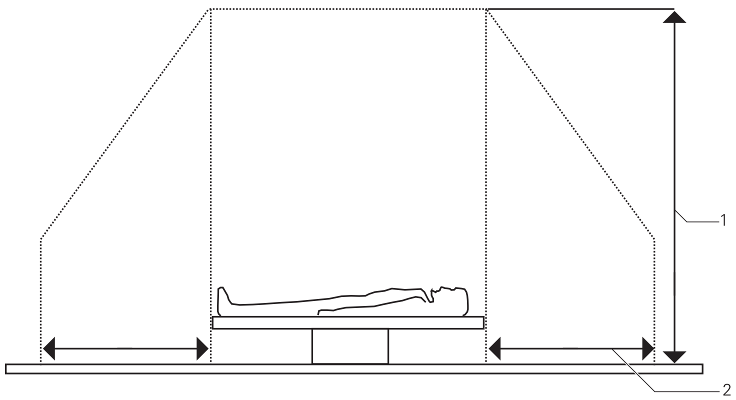
For additional information and other possible combinations, please refer to the Medical Electrical Equipment Standard EN 60601-1-1 or IEC 60601-1-1, Annex BBB.7, Scenario 3c.

Note: The above information is based on current EN 60601-1-1 and IEC 60601-1-1 standards, dated 2000-12.If your country's regulatory standards for medical equipment do not correspond to EN 60601-1 and IEC 60601-1, as well as, EN 60601-1-1 and IEC 60601-1-1, your local requirements may differ.

Patient Environment



1 Patient environment (represented by shading, extending exactly 1.5 meters (1.8 meters [6 feet] in Canada and the U.S.A.) around patient and ultrasound system)
2 Ultrasound system
3 Peripheral equipment (EN XXXXX and IEC XXXXX)
4 Peripheral equipment power
5 Medically-approved isolation transformer
6 Medically-approved isolation transformer power cord
7 Printer data cable
8 Additional protective earth
9 Ultrasound system power



1 2.5 meters (typical)
2 1.5 meters (1.8 meters [6 feet] in Canada and the U.S.A.)

USB Report Printers

A USB printer for printing patient reports can be connected to the ultrasound system at one of the USB ports located on the input/output panel on the left side of the system.A USB port on the ultrasound system has the capability for use with a USB printer compatible with the HP PCL 3 protocol.

You must observe all safety precautions for connecting a non-medical device to the ultrasound system.

Note: The **SET** key on the control panel functions as a point-and-select device (similar to a computer mouse) when used with the trackball.To select an on-screen object such as a button or a check box, roll the trackball to position the pointer (cursor) on the object and then press the **SET** key on the control panel.

Connecting and Installing a USB Printer

Before beginning this procedure, ensure that the USB printer is disconnected from the ultrasound system.

To connect a USB printer:

1. Press the on/off (⏻) switch to power on the ultrasound system.

   When the power on sequence is complete, the system displays the active image screen.

2. Power on the USB printer and ensure that there is paper in the feeder tray.
3. Connect the USB cable from the printer to a USB port on the input/output panel on the left side of the ultrasound system.

   After a few seconds, the system displays the **Found New Hardware Wizard** dialog box.

   Note: If the system does not display the new hardware dialog box, then it displays an error dialog box.You must alternatively use the "Alternate USB Printer Installation" procedure.

4. Press the **MENU** key on the control panel to activate the trackball pointer.
5. Select **Install from a list or specific location (Advanced**) and then select **Next**.

   The system displays a new dialog box.

6. Select **Don't search. I will choose the driver to install.** and then select **Next**.

   The system displays a new dialog box.

7. Ensure that the **Show compatible hardware** check box is not selected.
8. Select **HP** in the **Manufacturer** column and **HP DeskJet** in the **Printers** column and then select the **Next** button.

   The system displays the **Update Driver Warning** dialog box.
9. Select **Yes**.

   The system displays the **Completing the Found New Hardware Wizard** dialog box.
10. Select **Finish**.

    The system displays the active image screen.
11. Select a USB printer and then print a report to confirm the installation.

System Reference

Confirming Installation 5-19

Alternate USB Printer Installation

Use this procedure when you have attempted to install a USB printer and the ultrasound system does not automatically display the **Found New Hardware Wizard** dialog box.

1. Press the **MENU** key on the control panel to activate the trackball pointer.
2. Select the **Cancel** button until the system displays the message **Do you want to continue Setup without copying this file.**
3. Select **No**.

   The system displays the active image screen.
4. Press the **F6** key.

   The system displays the **Preset Main Menu**.
5. Select **DIMAQ Utility** on the left of the screen.

   The system displays the **DIMAQ Utility** screen.
6. Select **Install Printer**.

   The system displays the **Add Printer Wizard** dialog box.
7. Select **Next**.

8. Follow these instructions for each wizard screen presented by the **Add Printer Wizard**.

Wizard Screen	User Action
Local or Network Printer	1. Select **Local printer attached to this computer**. 2. Clear (disable) the **Automatically detect and install my Plug and Play printer** check box. 3. Select **Next**.
Select a Printer Port	1. Select **Use the following port:**. 2. Select the down arrow on the right. 3. Select an available USB port (for example, **USB001 (Virtual printer port for USB)**). 4. Press the **SET** key. 5. Select **Next**.
Install Printer Software	1. Select **HP** in the **Manufacturer** column. 2. Select **HP DeskJet** in the **Printers** column. 3. Select **Next**.
Use Existing Driver	1. Select **Keep existing driver (recommended)**. 2. Select **Next**.
Name Your Printer	1. Select **Yes**. 2. Select **Next**.
Printer Sharing	1. Select **Do not share this printer**. 2. Select **Next**.
Print Test Page	1. Select **Yes**. 2. Select **Next**.
Completing the Add Printer Wizard	1. Select **Finish**. 2. Select the **OK** button after the test page prints.

The system displays the **DIMAQ Utility** screen.

9. Select **OK**.

   The system displays the active image screen.

10. Select a USB printer and then print a report to confirm the installation.

System Reference

Confirming Installation 5-19

Confirming Installation

To confirm installation, select a USB printer and then print a report.

Selecting the USB Printer

Use the system presets to select a USB printer as the system's report printing device.

To select a USB printer:

1. Press the **F6** key on the keyboard.

   The system displays the **Preset Main Menu**.

2. Select **Peripheral** from the left of the screen.
3. Select the **USB Printer** check box.
4. Select the **Select** button to the right of the **USB Printer** check box.

   The system displays a list of the installed USB printers.

5. Select the required printer and then select the **OK** button.
6. Select the **Save** button.

   The system displays the active image screen.

Testing the USB Printer Installation

Test the installation of the printer by printing a report.

Note: You can perform this test without actual data in a report.

To test the USB printer installation:

1. Press the **F5** key on the keyboard.

   The system displays the **Exam and QuickSet** screen.

2. Select **OB**.
3. Press the **F2** key.

   The system displays an obstetrical report.

4. Select the **Send Report** button on the lower right of the screen.

   The system sends the report to the selected USB printer and changes the **Send Report** button to **Cancel**.

   a. To interrupt immediately, select the **Cancel** button.

   b. To stop after the current page, press the **ESCAPE** key.

Configuring Automatic Printing of Stored Images

(Requires software version 2.0 or higher)

You can enable or disable automatic printing of stored images.

When automatic printing is enabled and you store an image to the ultrasound system's hard disk, the system automatically prints the stored image to the selected USB printer.

To enable or disable automatic printing of stored images, choose a method:

- Use the **Ctrl+U** shortcut: Press and hold the **Ctrl** key on the keyboard and then press the **U** key on the keyboard.
- Use the system presets:
  a. Press the **F6** key to display the **Preset Main Menu**.
  b. Select **DIMAQ Utility** on the left of the screen**.**

     The system displays the **DIMAQ Utility** screen.
  c. Select the **Autoprint Images** check box in the **Printer** section of the screen.
  d. Select the printer from the drop-down list in the **Printer** section of the screen.
  e. Select the **Save** button to save changes and redisplay the image screen.

Mitsubishi P93W Printer Installation

This installation procedure provides instructions for installing the Mitsubishi P93W printer to the ultrasound imaging system.

Preparing the Ultrasound System

REQUIREMENTS:

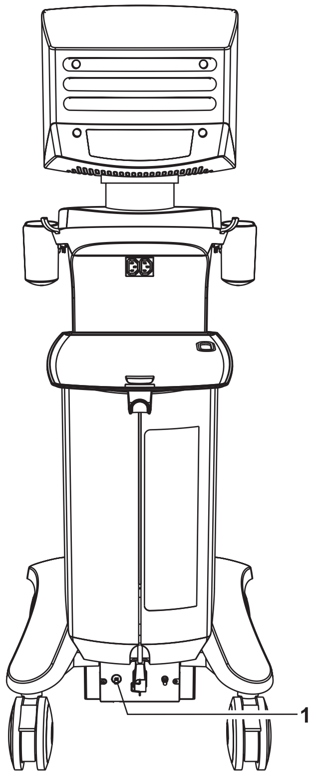
- SONOLINE G20 ultrasound system

To prepare the ultrasound system for installation of the P93W printer:

1. Power off the ultrasound system: press the partial on/off (⏻) switch located on the upper left of the control panel on the ultrasound system.

   The switch glows amber to indicate that the system power is in a standby status.

2. Push down the circuit breaker (located at the bottom of the back panel on the ultrasound system).



1 Circuit Breaker

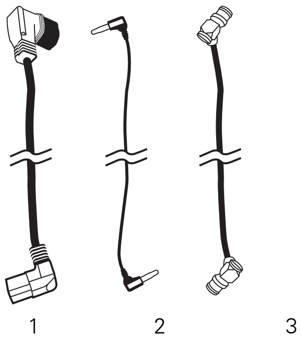
Location of circuit breaker on the ultrasound system.

3. Unplug the power cord from the wall receptacle.
4. Disconnect all transducers.
5. Press each brake lever to lock the wheels.
6. Unscrew the mounting bracket located on the rear shelf of the ultrasound system and remove the bracket from the system.

Routing the Cables

REQUIREMENTS:

- Ultrasound system (completely disconnected from power supply)
- Mitsubishi P93W Kit Contents:
  - Printer
  - User manual for the Printer
  - Thermal paper for the Printer
  - Power cable
  - Remote cable
  - BNC cable

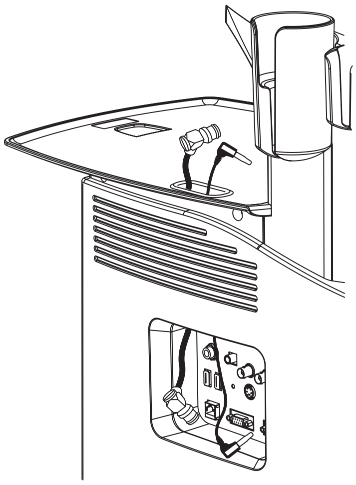


1 Power Cable
2 Remote Cable
3 BNC Cable

To route the printer cables on the ultrasound system:

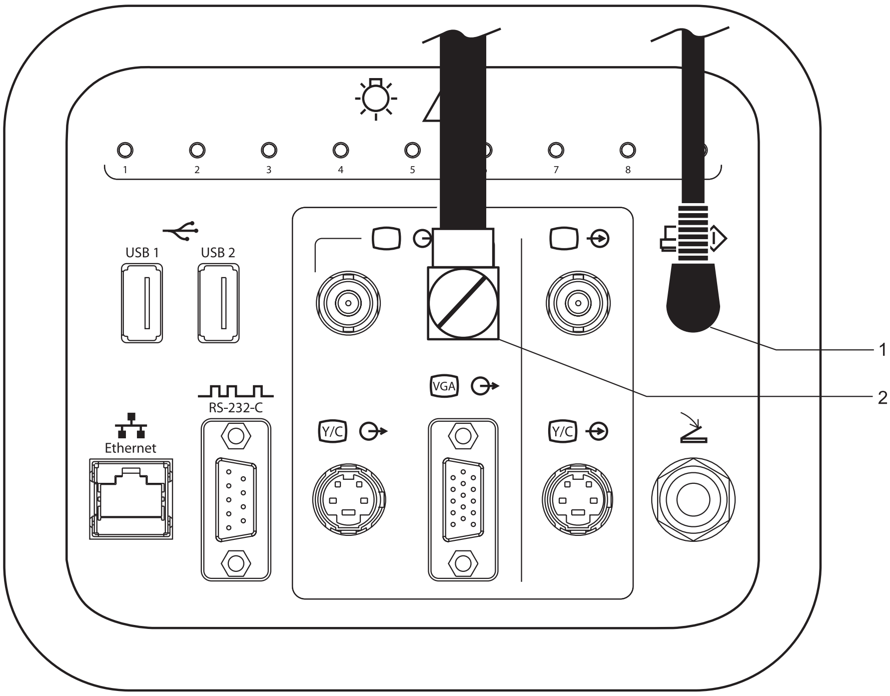
⚠ **WARNING:** Avoid electrical safety hazards.Ensure that the cables are carefully routed according to the installation instructions.Improperly routed cables can cause the ultrasound system to exceed standards for electromagnetic compliance.

1. Route the BNC cable and the remote cable through the access hole (located on the left of the ultrasound system's rear shelf) toward the input/output panel.



Routing the BNC cable and remote cable through the access hole toward the input/output panel.

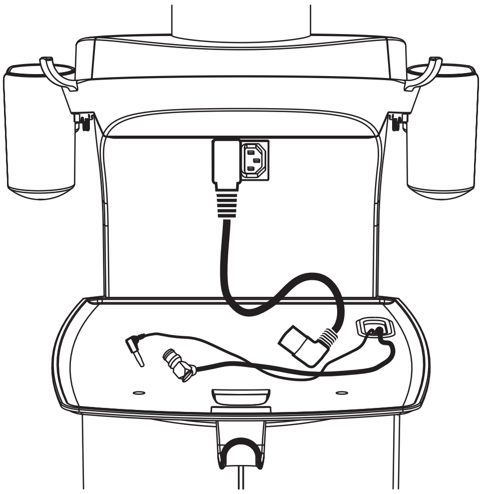
2. Connect the cables to the input/output panel.
    a. Connect the BNC cable to the middle BNC connector.
    b. Connect the remote cable to the printer connector.



1 BNC Cable
2 Remote Cable

Connecting the BNC cable and remote cable to the input/output panel.

3. Connect the printer's power cable to one of the ultrasound system's accessory outlets (located at the back of the ultrasound system, above the rear shelf).



Connecting the power cable to the accessory outlet.

4. Position the power cable toward the side of the ultrasound system with the input/output panel.

Attaching the Mounting Bracket to the Printer

REQUIREMENTS:

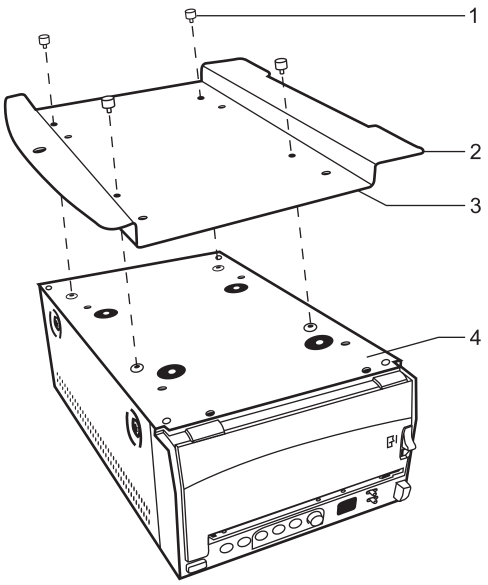
- Mounting bracket (removed from rear shelf of ultrasound system)
- Four thumb screws (packaging is affixed to the bottom of the mounting bracket)
- Printer

To attach the mounting bracket to the printer:

⚠ **WARNING:** Avoid equipment damage and personal injury.You must use the thumb screws provided in the packaging with the mounting bracket.Use of a substitute thumbscrew can possibly result in equipment damage and potential personal injury.

⚠ **WARNING:** Avoid equipment damage and personal injury.Ensure that the screws are tightly fastened.Unsecured screws can cause the printer to dislodge and possibly result in equipment damage and potential personal injury.

1. Position the printer upside down with the front of the printer facing you.
2. Position the mounting bracket upside down over the four screw holes on the bottom of the printer with the mounting bracket's tabs positioned to the right.



1 Thumb screw
2 Tab
3 Mounting bracket
4 Bottom of printer

Positioning the mounting bracket on the printer.

3. Remove the packaging with the thumbscrews affixed to the bottom of the mounting bracket.
4. Tightly fasten the mounting bracket to the printer with the four thumbscrews

Installing and Connecting the Printer

REQUIREMENTS:

- Ultrasound system (completely disconnected from power supply)
- Printer cables connected to ultrasound system (power cable, BNC cable, and remote cable)
- Printer and attached mounting bracket (upright position)

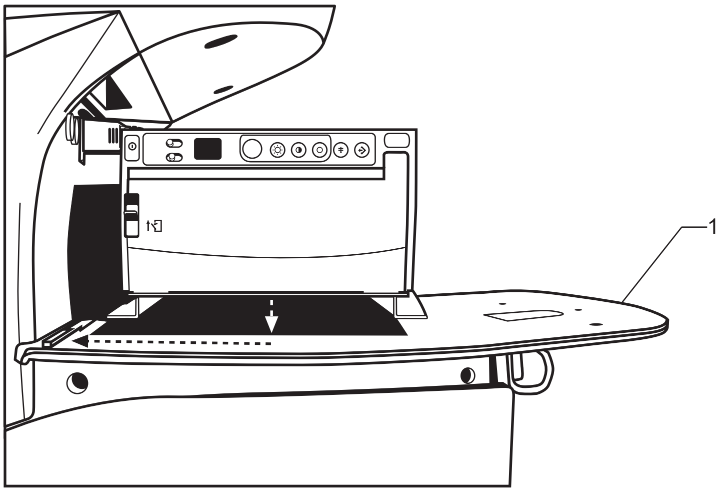
To install the printer on the ultrasound system:

⚠ **WARNING:** Avoid electrical safety hazards.Ensure that the mounting bracket does not bind any cable during the installation process.Pinched or damaged cables can cause the ultrasound system to exceed standards for electromagnetic compliance.

⚠ **WARNING:** Avoid equipment damage and personal injury.Use extreme care when handling the printer and attached mounting bracket.Dropping the printer can cause equipment damage and potential personal injury.

⚠ **WARNING:** Avoid equipment damage and personal injury.Ensure that the screws are tightly fastened.Unsecured screws can cause the printer to dislodge and possibly result in equipment damage and potential personal injury.

1. Slide the printer and attached mounting bracket toward the front of the ultrasound system so that the tabs on the bracket fit into the two slots on the ultrasound system's rear shelf.

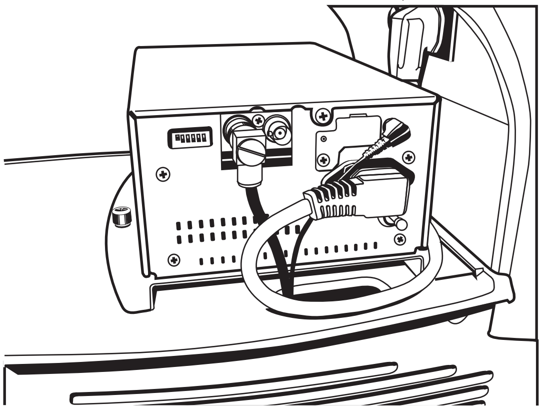


1 Rear of System

Attaching the bracket and printer to the ultrasound system.

2. Ensure that the mounting bracket is not binding any cable.
3. Tightly fasten the mounting bracket (rear) to the ultrasound system with the thumbscrew.

4. Connect the printer cables from the ultrasound system to the back of the printer.
   a. Connect the power cord to "AC LINE."
   b. Connect the BNC cable to "IN VIDEO."
   c. Connect the remote cable to "REMOTE."



Connecting the cables to the printer.

5. Ensure that the DIP SW 1 control (on the back of the printer) is set to "ON" and that the DIP SW 2 through 6 controls are set to "OFF."

Confirming settings of DIPswitch.

6. Verify the operation of the printer.

Powering on the System

1. Ensure that the printer and mounting bracket are securely attached to the ultrasound system.
2. Connect a transducer to the ultrasound system.
3. Connect the power cord to a wall receptacle.
4. Push up the circuit breaker (located at the bottom of the back panel on the ultrasound system).
5. Power on the ultrasound system: press the partial on/off (⏻) switch located on the upper left of the control panel on the ultrasound system.

   The switch glows blue to indicate that the system is powered on.
6. Confirm that a 2D-mode image displays on the monitor.

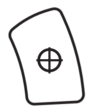
Verifying Printer Operation

1. Press the power switch on the left of the printer to power on the printer.
2. Set up the ultrasound system for printing to the printer as follows:
   a. Press **F6** on the keyboard.

      The system displays the **Preset Main Menu** screen.

   b. Roll the trackball to highlight **Customize Keys** along the left of the screen and then press the **SET** key on the control panel.

      The system displays the **Customize Keys** screen.



Set.

   c. Under **Print/Store Key**, select **B/W Printer** and then press the **SET** key.

   d. Select **Save** and then press the **SET** key on the control panel.

      The system displays the ultrasound image.
3. Press the **PRINT/STORE** key and verify that the image is printed correctly on the printer.

Print Store.

4. For troubleshooting the operation of the printer, refer to the user manual for the printer.

6 DICOM Connectivity Option

About DICOM

Important Note: Before using the DICOM Connectivity option, familiarize yourself with the functionality of the DIMAQ-IP Study and Image screens.

System Reference

Study screen	Ch 5
Image screen	Ch 5

The DICOM (Digital Imaging and Communications in Medicine) Connectivity option works in conjunction with the DIMAQ-IP integrated workstation to provide digital image transfer via a DICOM network for both storage and printing. With the option installed, the ultrasound system is a DICOM Storage Class User and DICOM Print Class User.

Current and Previous Studies

This chapter describes studies as ***current*** or ***previous***. Since the ultrasound system allows only one patient to be registered at a time, a current study is linked to that patient. You initiate a current study (examination) by registering a patient. This study remains current until you create a new study by:

- Registering a new patient after pressing the **F1** key or
- Re-registering the current patient by selecting the **New** button on the Study screen.

You can also end a current study without creating a new study by:

- Selecting the **Close Study** button in the Image screen or the **Close** button in the Study screen, or
- Shutting down the ultrasound system.

A current study that has been ended in any of these ways becomes a previous study. A previous study remains linked to its original patient data and can be accessed from the Study screen. Original patient data cannot be changed in a previous study.

Screens

The following screens are used with DICOM and are accessed by pressing the **REVIEW** key on the control panel:

- ***Image screen*** – Displays images for the currently selected study. When the DICOM option is installed, includes selections for sending images to DICOM printers.

  Note: In this chapter, the term "Image screen" refers to a screen within the DIMAQ-IP feature. In other chapters of the operating instructions, the use of "image screen" refers to a typical live image screen that displays real-time images as they are acquired.

- ***Study screen*** – Lists studies that are saved on the selected disk (HD or CD). When the DICOM option is installed, includes selections for sending studies to DICOM printers and storage servers.
- ***DICOM screen*** – Displays tabs for pages that list current DICOM activity:
  - **DICOM BW Printer Layout** displays black and white images assembled according to a selected format for the **DICOM Print Queue**.
  - **DICOM Print Queue** lists images sent to the DICOM printer.
  - **DICOM Store Queue** lists images sent to the DICOM storage server.

[1] Instructions for Use

Example of typical "Image screen" Ch 1

DICOM Storing and Printing

You can send images from current or previous studies to the **DICOM Store Queue** as follows:

- You can send all images directly from the Study screen to the **DICOM Store Queue** for a previous study.
- If the **Autostore to DICOM** setting is selected in the system presets, you can automatically send all images in the Image screen to the **DICOM Store Queue** when a current study is closed.

You can print from current or previous studies to a DICOM printer as follows:

- You can assemble individual images on a printer layout page in a current or previous study.
- You can print single or multiple pages of images from a printer layout page in a current or previous study.
- You can send all images from a previous study directly to a printer queue from the Study screen.
- The following settings in the system presets also allow the ultrasound system to print automatically when certain conditions are met:
  - If the **Print When Page Is Full** setting is selected, a page is sent to the **DICOM Print Queue** as soon as the last image required by the page layout is added. An incomplete page is automatically sent to the **DICOM Print Queue** when you close a current study or select another study.
  - If the **Print At End Of Exam** setting is selected, you can assemble multiple pages prior to printing, and all pages are automatically sent to the **DICOM Print Queue** when you close a current study or select another study.

F6

Storage
▶ Autostore to DICOM[1]
DICOM
▶ Print When Page is Full
▶ Print at End of Exam
▶ Autostore to DICOM[2]

[1] For software versions below 2.0

[2] For software versions 2.0 and higher

Storing Studies

All current and previous studies on the system's hard disk are listed in the Study screen when **HD** is selected in the **Disk** box of the Study screen. All studies stored on the system's compact disk are listed in the Study screen when **CD** is selected in the **Disk** box.

You can access images from a previous study without closing the current study.

DICOM Setup

F6

DICOM Storage

Prerequisite: A working knowledge of Windows networking principles is necessary and beneficial for completing DICOM configuration.

Use the system presets to set up DICOM.

DICOM Setup requires the following information:

- Ultrasound system (host) host name, alias, AE title, IP address, port number, subnet mask, and default gateway
- Media type and duplex mode required for connection to the host (ultrasound system)
- Alias, AE title, IP address, and port number for each DICOM device

You must check the storage server for compatibility with the ultrasound system settings.

To begin DICOM Setup, connect a network cable to the Ethernet port on the Input/Output panel of the ultrasound system.

Configuring the System and Devices for DICOM

You can configure the ultrasound system and connected devices (such as servers and printers) for DICOM by creating, editing, and activating aliases (DICOM configurations). You can also delete aliases.

Creating and Editing Aliases

You can create and edit aliases (DICOM configurations) for the host (ultrasound system) and other devices, such as servers and printers.

For software versions 2.0 and higher:

To display the DICOM configuration screen for the required alias (DICOM configuration):

Note: DICOM configuration screens cannot be displayed during a patient examination. If a patient is registered, then close the study before beginning this procedure.

1. Press the **F6** key on the keyboard and then select **DICOM** on the left of the **Preset Main Menu** screen.

   The system displays the **DICOM** screen.

2. To edit an existing alias, select the alias from the related drop-down list and then select the **Edit** button to the right of the selected configuration. For example, to edit the "archive1" storage server alias, select "archive1" from the **Storage Server** drop-down list and then select the **Edit** button to its right.

   The system displays the DICOM configuration screen for the selected alias, containing the existing configuration.

3. To create an alias, select the **New** button to the right of the related drop-down list. For example, to create a storage server alias, select the **New** button to the right of the **Storage Server** drop-down list.

   The system displays the DICOM configuration screen for the selected type of alias.

For software versions 2.0 and higher:

To create or edit an alias (DICOM configuration):

1. Display the required DICOM configuration screen and then use the following instructions to change configuration:
    a. Use the keyboard to enter values for the fields in the screen.
    b. If the alias is a device connected to the ultrasound system (such as a server or printer), then confirm successful connection and valid configuration information:
        - To verify connection, select the **Ping** button.
        - To verify connection and configuration information, select the **Echo** button.
    c. To create a record of the configuration settings, print the screen.

        Note: Siemens recommends retaining a record of the configuration settings. This information is useful in identifying incomplete or incompatible entries if a communication failure occurs or during troubleshooting.
    d. To save configuration changes and redisplay the **DICOM** screen, select the **OK** button at the bottom of the DICOM configuration screen.
    e. To cancel configuration changes and redisplay the **DICOM** screen, select the **Cancel** button and then select **Yes** to confirm cancellation.
2. Activate the new alias by selecting the alias from the related drop-down list on the **DICOM** screen. For example, to activate the "archive2" storage server alias, select "archive2" from the **Storage Server** drop-down list.

3. Perform the following additional configuration(s), as necessary:

Alias…	Do this:
Host	To indicate the status of network connection in the **Network** section of the Study screen, select the **Show network status** check box below the selected host alias.
Storage server	Select a queuing method listed below the selected storage server alias: ▪ **Store During Exam** adds each image to the **DICOM Store Queue** list when you store the image to the study. ▪ **Store At End Of Exam** adds all images to the **DICOM Store Queue** list when you close the study. **Note:** To view the **DICOM Store Queue** list, press **REVIEW** to display the Study screen, select the required study, select **DICOM Screen**, and then select the **DICOM Store Queue** tab. To automatically send all stored images to the DICOM storage server, select the **Autostore to DICOM** check box below the selected storage server alias.
Storage commitment server	Select a storage method listed below the selected storage server alias: **Note:** Siemens recommends the **After All Images are Stored** selection. ▪ **After Every Image is Stored** automatically sends each image when you store the image to the study. ▪ **After All Images are Stored** automatically sends all stored images when you close the study.
Worklist server	To configure the system to perform a search of all procedures on the Worklist server for the next 24 hours, select the **Streamlined Search** check box below the selected Worklist server alias. **Note:** If performing the streamlined search from the Patient Data form, the system uses any data entered onto the form to narrow the search.
DICOM printer	Select a printing protocol listed below the selected DICOM printer alias: ▪ **Print When Page is Full** automatically prints a page when the last image is added to the page. The maximum images-per-page value is defined by the **Display Format** setting in the respective **DICOM Printer Setup** screen. ▪ **Print At End of Exam** automatically prints all images when the study is closed. **Note:** Select the **more…** button to display additional fields.

4. To save all configuration changes and exit the system presets, select the **Save** button.

   If you changed any host configuration information, then the system prompts you to reboot the ultrasound system (cycle power).

5. To cancel all configuration changes and exit the system presets, select the **Cancel** button and then select **Yes** to confirm cancellation.
6. If the system prompts you to reboot the ultrasound system, or if you added or changed a host name or IP address for any aliases, then reboot the ultrasound system (cycle power) to complete the configuration.

For software versions below 2.0:

To create or edit an alias (DICOM configuration):

Note: DICOM configuration screens cannot be displayed during a patient examination. If a patient is registered, then close the study before beginning this procedure.

1. Display the **Active Setup** screen and then select an alias for editing or an alias type (such as a server or printer) for creating:
   a. Press the **F6** key on the keyboard and then select **DICOM** on the left of the **Preset Main Menu** screen to display the **Active Setup** screen.
   b. To edit an existing alias, select the alias from the related drop-down list and then select the **Edit** button to the right of the selected configuration. For example, to edit the "archive1" storage server alias, select "archive1" from the **Storage Server** drop-down list and then select the **Edit** button to its right.
   c. To create an alias, select the **New** button to the right of the related drop-down list. For example, to create a storage server alias, select the **New** button to the right of the **Storage Server** drop-down list.
2. Use the keyboard to enter values for the fields in the screen.
3. If the alias is a device connected to the ultrasound system (such as a server or printer), then confirm successful connection and valid configuration information:
   - To verify connection, select the **Ping** button.
   - To verify connection and configuration information, select the **Echo** button.
4. To create a record of the configuration settings, print the screen.

   Note: Siemens recommends retaining a record of the configuration settings. This information is useful in identifying incomplete or incompatible entries if a communication failure occurs or during troubleshooting.
5. To cancel configuration changes and exit the DICOM configuration screen, select the **Cancel** button.

   The system exits the DICOM configuration screen without saving changes.

6. To save configuration changes, select the **OK** button and then select **Yes** to confirm changes.

   The system saves changes and exits the DICOM configuration screen.

7. To activate the alias (such as a server or printer), select the alias from the related drop-down list on the **Active Setup** screen. For example, to activate the "archive2" storage server alias, select "archive2" from the **Storage Server** drop-down list.

8. If the alias is a Worklist server, then to configure the system to perform a search of all procedures on the Worklist server for the next 24 hours, select the **Streamlined Search** check box below the selected Worklist server alias on the **Active Setup** screen.

   Note: If performing the streamlined search from the Patient Data form, the system uses any data entered onto the form to narrow the search.

9. If the alias is a DICOM printer, then select a printing protocol listed below the selected DICOM printer alias:

   – **Print When Page is Full** automatically prints a page when the last image is added to the page. The maximum images-per-page value is defined by the **Display Format** setting in the respective **DICOM Printer Setup** screen.

   – **Print At End of Exam** automatically prints all images when the study is closed.

10. To save changes on the **Active Setup** screen, select the **OK** button and then select **Yes** to confirm changes.

11. To save changes and exit the **Preset Main Menu**, select the **Save** button.

    If you changed any host configuration information, then the system prompts you to reboot the ultrasound system (cycle power).

12. If the system prompts you to reboot the ultrasound system, or if you added or changed a host name or IP address for any aliases, then reboot the ultrasound system (cycle power) to complete configuration.

Activating Aliases

You can activate existing aliases (DICOM configurations) for the host (ultrasound system) and other devices, such as servers and printers.

To activate an existing alias:

Note: DICOM configuration screens cannot be displayed during a patient examination. If a patient is registered, then close the study before beginning this procedure.

1. Press the **F6** key on the keyboard and then select **DICOM** on the left of the **Preset Main Menu** screen.

   For software versions 2.0 and higher: The system displays the **DICOM** screen.

   For software versions below 2.0: The system displays the **Active Setup** screen.

2. Select the alias from the related drop-down list. For example, to activate the "archive1" storage server alias, select "archive1" from the **Storage Server** drop-down list.
3. For software versions below 2.0: To save changes on the **Active Setup** screen, select the **OK** button and then select **Yes** to confirm changes.
4. To automatically store studies to DICOM (typically required for MPPS devices), choose a method.
   - For software versions 2.0 and higher: Select the **Autostore to DICOM** check box below the storage server alias.
   - For software versions below 2.0: Select **Storage** on the left of the **Preset Main Menu** screen and then select the **AutoStore to DICOM** check box to activate automatic storage of studies to DICOM.
5. To save changes and exit the system presets, select the **Save** button.

   If you changed any host configuration information, then the system prompts you to reboot the ultrasound system (cycle power).

6. If the system prompts you to reboot the ultrasound system, or if you added or changed a host name or IP address for any aliases, then reboot the ultrasound system (cycle power) to complete configuration.

Deleting Aliases

You can delete aliases (DICOM configurations) for the host (ultrasound system) and other devices, such as servers and printers.

To delete an alias:

Note: DICOM configuration screens cannot be displayed during a patient examination. If a patient is registered, then close the study before beginning this procedure.

1. Press the **F6** key on the keyboard and then select **DICOM** on the left of the **Preset Main Menu** screen.

   For software versions 2.0 and higher: The system displays the **DICOM** screen.

   For software versions below 2.0: The system displays the **Active Setup** screen.

2. For software versions 2.0 and higher:

   – Select the alias from the related drop-down list (such as the **Storage Server** drop-down list), select the **Delete** button to the right of the selected alias, and then select **OK** to confirm.

     The system deletes the DICOM configuration.

3. For software versions below 2.0:

   a. Select the alias from the related drop-down list and then select the **Edit** button to the right of the selected configuration. For example, to select a storage server alias, select the alias from the **Storage Server** drop-down list and then select the **Edit** button to its right.

      The system displays the DICOM configuration screen for the selected alias.

   b. Select the **Delete** button and then select **Yes** to confirm changes.

      The system deletes the DICOM configuration and exits the DICOM configuration screen.

   c. Select the **OK** button from the **Active Setup** screen and then select **Yes** to confirm changes.

4. To save changes and exit the system presets, select the **Save** button.

   If you changed any host configuration information, then the system prompts you to reboot the ultrasound system (cycle power).

5. If prompted, reboot the ultrasound system (cycle power).

Field Descriptions for DICOM Configuration Screens

Fields in the Host Setup Screen

Field	Settings
Alias	text entry
AE Title	text entry
Host Name	text entry
MAC Address[1]	display only (indicates the Media Access Control address detected for the host)
Workgroup[2]	text entry (disregard this field; workgroup information is not required)
Use DHCP (Use Dynamic Host Control Protocol)	On (checked) Off (cleared)
IP Address	text entry
Subnet Mask	text entry
Default Gateway	text entry
Port Number[2]	**104**
Media Type	**HardwareDefault** **AUTOSELECT** **100BASETX** **10BASET**
Duplex Mode	**HardwareDefault** **HalfDuplex** **FullDuplex**

[1] Requires software version 2.0 or higher

[2] For software versions below 2.0

Fields in the DICOM Storage Server Setup Screen

Field	Settings
Alias	text entry
AE Title	text entry
IP Address	text entry
Port Number	text entry
Write Timeout in Seconds (timeout value for sending to the queue)	text entry
Connect Timeout in Seconds (timeout value for an attempted connection between the host and the storage server)	text entry
Image Format	Specifies the DICOM format used to transfer images and clips to the storage server. **Note:** Calibration information is included with the "New Ultrasound" format only. ▪ **Automatic** specifies the highest quality format that is supported by the server: "New Ultrasound," "Old Ultrasound," or "Secondary Capture" (listed in sequence from highest quality to lowest quality). ▪ **Old Ultrasound** specifies the highest quality format that is supported by the server: "Old Ultrasound" (highest quality) or "Secondary Capture" (lowest quality). ▪ **Secondary Capture** specifies the "Secondary Capture" format. The "Secondary Capture" format does not support clips.
Clip Format[1]	Specifies the format used to transfer clips to the storage server. ▪ **Monochrome, Uncompressed** ▪ **Color JPG Compressed** **Note:** The system adds the DICOM attributes for "window" and "level" information to monochrome-formatted images.

[1] Requires software version 2.0 or higher

Field	Settings
Number of Times to Retry Failure[1], **Number of Times to Retry Failed Store**[2]	text entry
Seconds Between Each Retry	text entry
Ping and Echo Timeout in seconds (timeout value for basic communication tests with the host)	text entry

Fields in the Worklist Server Setup Screen

Field	Settings
Alias	text entry
AE Title	text entry
IP Address	text entry
Port Number	text entry
Maximum Number of MW item (maximum number of search results displayed on the **Worklist Search** screen)	text entry
Ping and Echo Timeout in seconds (timeout value for basic communication tests with the host)	text entry
Write Timeout in Seconds[1] (timeout value for sending to the Worklist server)	text entry
Connect Timeout in Seconds[1] (timeout value for an attempted connection between the host and the Worklist server)	text entry

[1] Requires software version 2.0 or higher

[2] For software versions below 2.0

Fields in the DICOM BW Printer Setup Screen

Note: For software versions below 2.0: This screen is titled **DICOM Printer Setup**.

Field	Settings
Alias	text entry
AE Title	text entry
IP Address	text entry
Port Number **Note:** If a separate computer controls the printer, the port number may differ from the port number used for the host and storage server.	text entry
Write Timeout in Seconds (timeout value for sending to the queue)	text entry
Connect Timeout in Seconds (timeout value for an attempted connection between the host and the DICOM printer)	text entry
Printer Type[2]	**Color** **Black and White**
Orientation[1], **Film Orientation**[2]	**Portrait** **Landscape**
Number of Times to Retry Failure[1], **Number of Times to Retry Failed Print**[2]	text entry
Seconds Between Each Retry	text entry
Display Format (defines the column and row format used for assembling pages to print) **Note:** Verify that the selected format is supported by the destination printer.	**1x1** **1x2** **2x2** **2x3** **3x2** **3x3** **3x5** **4x5** **4x6** **5x6**
Copies (number of copies to print)	text entry

[1] Requires software version 2.0 or higher

[2] For software versions below 2.0

Field	Settings
Medium Type	**paper** **clear film** **blue film** **transparency**
Min. Density **Note:** Consult the printer manufacturer for appropriate values.	**1** to **399**
Max. Density **Note:** Consult the printer manufacturer for appropriate values.	**1** to **399**
Border Density (defines the region outside of the print area on the output medium; typically black for film and white for paper)	**Black** **White**
Trim (outlines each printed image with a box)	**yes** **no**
Film Size	**8in x 10in** **8.5in x 11in** **10in x 12in** **10in x 14in** **11in x 14in** **11in x 17in** **14in x 14in** **14in x 17in** **24cm x 24cm** **24cm x 30cm** **A3** **A4**
Print Priority	**high** **medium** **low**

Field	Settings
Film Destination	**magazine**
	processor
	current
Magnification	**replicate**
	bilinear
	cubic
	none
Smoothing Type (used with cubic magnification) **Note:** This field is not required.	text entry
Empty Image Density	**black** (typically used for transparencies)
	white (typically used for paper)
Polarity	**normal**
	reverse
Configuration **Note:** This string is sent to the printer exactly as it displays in this field. **Note:** This field is not required.	text entry
Ping and Echo Timeout in seconds (timeout value for basic communication tests with the host)	text entry

Fields in the Storage Commitment Setup Screen

(Requires software version 2.0 or higher)

Field	Settings
Alias	text entry
AE Title	text entry
IP Address	text entry
Port Number	text entry
Number of Times to Retry Failure	text entry
Seconds Between Each Retry	text entry
Write Timeout in Seconds	text entry
Connect Timeout in Seconds	text entry
Ping and Echo Timeout in seconds	text entry

Fields in the MPPS Setup Screen

(Requires software version 2.0 or higher)

Field	Settings
Alias	text entry
AE Title	text entry
IP Address	text entry
Port Number	text entry
Number of Times to Retry Failure	text entry
Seconds Between Each Retry	text entry
Write Timeout in Seconds	text entry
Connect Timeout in Seconds	text entry
Ping and Echo Timeout in seconds	text entry
Store Image Format	**New Ultrasound** (for 1995 and newer ultrasound IODs) **Old Ultrasound** (for pre-1995 ultrasound IODs) **Secondary Capture** (for systems that do not support ultrasound IODs)

DICOM Storing and Printing

You can store and print images to DICOM devices.

Configuring Clip Options for DICOM

(Requires software version 2.0 or higher)

Use the system presets to configure clip options such as length.

With DICOM, consider the following issues when storing multiple clips:

- Multiple, longer clips can require considerable storage server memory and transfer time.
- High compression requires less storage server memory and transfer time.
- The number of clip frames in a clip is determined by the duration selected in the system presets and the capture rate. The capture rate is either 40 Hz (during live imaging) or the acoustic frame rate (during CINE).

F6

Customize Keys
Clip Capture

System Reference

Clip capture Ch 4

Configuring the System for In-Progress Store

You can configure the system for in-progress store.

When the system is configured for in-progress store and you press a documentation key that is configured for disk storage, the system stores the image or report to the DICOM storage server and to the system's hard disk.

For software versions 2.0 and higher:

To configure the system for in-progress store:

Note: DICOM configuration screens cannot be edited during a patient examination. If a patient is registered, then close the study before beginning this procedure.

1. Press the **F6** key on the keyboard and then select **DICOM** on the left of the **Preset Main Menu** screen.

   The system displays the **DICOM** screen.

2. Select the **Store During Exam** option and the **Autostore to DICOM** check box below the storage server alias.
3. Select the **Save** button to save the settings.
4. Configure one or more keys for disk storage.
   a. Press the **F6** key on the keyboard to redisplay the **Preset Main Menu** screen.
   b. Select **Customize Keys** on the left of the screen.
   c. Select **Disk Store** for one or more of the documentation keys.
   d. To save changes and exit the **Preset Main Menu**, select the **Save** button.

For software versions below 2.0:

To configure the system to store an image to the hard disk and to the DICOM storage server (in-progress store):

Note: DICOM configuration screens cannot be displayed during a patient examination. If a patient is registered, then close the study before beginning this procedure.

1. Access the **Active Setup** screen by pressing the **F6** key on the keyboard and then selecting **DICOM** on the left of the **Preset Main Menu**.
2. On the **Storage Server** line of the **Active Setup** screen, select **Store During Exam**.
3. Select **OK** and then **Yes** to save the settings.
4. Access the storage screen by selecting **Storage** on the left of the **Preset Main Menu**.
5. Select **Autostore to DICOM**.
6. Select **Save** to save the settings.
7. To display the **Preset Main Menu** again, press the **F6** key.
8. Select **Customize Keys** on the left of the **Preset Main Menu**.
9. Select **Disk Store** for one or more of the documentation keys.

   Pressing one of these keys will now cause the system to send the image or report to the hard disk and the DICOM Store Queue.
10. To save changes and exit the **Preset Main Menu**, select the **Save** button.

Storing Images to DICOM Storage Servers

You can send selected studies to a connected DICOM storage server.

Note: For software versions below 2.0, you cannot send the current study.

You can also automatically send stored images during the current study when the system is configured for in-progress store.

System Reference

Configuring the System for In-Progress Store 6-24

To send selected studies to a connected DICOM storage server:

Note: For software versions 2.0 and higher: The studies must be stored on the hard disk.

1. Press the **REVIEW** key on the control panel.
2. If the system displays the Image screen, select the **Study Screen** button.
3. For software versions below 2.0:
   - If the study is stored on a CD, insert the CD into the CD drive, select the **Load** button in the **CD** section of the Study screen to close the CD tray, and then select **CD** in the **Disk** section of the Study screen.
   - If the study is stored on the hard disk, then select **HD** in the **Disk** section of the Study screen.
4. For software versions 2.0 and higher: Select **HD** in the **Disk** section of the Study screen.
5. Select a study from the Study screen.
   - To select an additional study, press and hold the **Ctrl** key on the keyboard and then press the **SET** key on the control panel.
   - To select consecutive studies, press and hold the **Shift** key on the keyboard and then press the **SET** key on the control panel.
6. Select the server from the drop-down list in the **Network** section (lower right of the screen) and then select the **Send** button.

   The system sends all images from the selected study or studies to the **DICOM Store Queue**.
7. To verify the status of the **DICOM Store Queue**, select the **DICOM Screen** button and then select the **DICOM Store Queue** tab.
8. To display the live image screen, select the **Back** button and then select the **Live Screen** button.

Printing Images to DICOM Printers

You can send an image to a connected DICOM printer during the current study. You can also print all images or selected images from a study to a connected DICOM printer.

Note: For software versions below 2.0, you cannot print images from the current study.

Note: Clips cannot be printed. You can select a clip frame for printing.

Note: The current number of images and the number of images necessary for each full page layout display in the lower left of the live image screen.

To send an image to a printer layout page in a current study:

1. Freeze the image.
2. Press the documentation key that is configured in the system presets for DICOM printing.

   The system saves the image to the system's hard disk and copies the image to the Image screen and to the corresponding layout page.
3. Press the **REVIEW** key on the control panel.

   The system displays the print image and any other images in the Image screen.
4. If necessary, select additional images from the Image screen for the printer layout.

   The system outlines each selected image.
5. Select the **BW Print** button on the left of the Image screen to copy the selection to the respective printer layout page.

   Note: The current number of images and the images necessary for a full page layout display to the right of the **BW Print** or **Color Print** button in the Image screen.

6. The print image is transferred to the **DICOM Print Queue** when one of the following actions occurs:
   - The **DICOM BW Printer Layout** or **DICOM Color Printer Layout** page is filled and **Print When Page Is Full** is selected in the system presets for DICOM.

     Note: The **Display Format** setting for the printer determines the number of images in a full page. If display format for a printer is set to '1/1', a page fills and is sent to the **DICOM Print Queue** immediately with each press of a documentation key configured for DICOM printing.
   - The **Print Page** or **Print All Pages** button is selected in the layout page.
   - The study is closed or a previous study is selected and **Print At End of Exam** is selected for this printer in the system presets for DICOM.

   A separate print queue entry is created for each page.
7. To verify the status of the **DICOM Print Queue**, select the **DICOM Screen** button from the Study screen and then select the **DICOM Print Queue** tab.
8. To change printing options for a set of printed images, select the **DICOM Screen** button from the Study screen, select the **DICOM Print Queue** tab, and then select the **Change** button at the top of the screen.
9. To display the live image screen, select the **Back** button and then select the **Live Screen** button.

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DICOM

To print all images from one or more studies to a DICOM printer:

Note: For software versions 2.0 and higher: The studies must be stored on the hard disk.

1. Press the **REVIEW** key on the control panel.

   The system displays the Study screen. If the system displays the Image screen, select the **Study Screen** button.

2. For software versions below 2.0:
   - If the study is stored on a CD, insert the CD into the CD drive, select the **Load** button in the **CD** section of the Study screen to close the CD tray, and then select **CD** in the **Disk** section of the Study screen.
   - If the study is stored on the hard disk, then select **HD** in the **Disk** section of the Study screen.
3. For software versions 2.0 and higher: Select **HD** in the **Disk** section of the Study screen.
4. Select a study from the Study screen.
   - To select an additional study, press and hold the **Ctrl** key on the keyboard and then press the **SET** key on the control panel.
   - To select consecutive studies, press and hold the **Shift** key on the keyboard and then press the **SET** key on the control panel.
5. Select the printer from the drop-down box in the **Network** section on the lower right of the Study screen and then select the **Send** button.

   The system sends all images from the selected study to the corresponding layout page(s) and to the DICOM printer queue.

6. To confirm that the study was sent to the printer, select the **DICOM Screen** button on the left of the screen and then select the **DICOM Print Queue** page.

   The system lists the studies that were sent to the printer.

7. To redisplay the Study screen, select the **Back** button
8. To display the live image screen, select the **Live Screen** button.

To print individual images from a study to a DICOM printer:

Note: For software versions 2.0 and higher: The studies must be stored on the hard disk.

1. Press the **REVIEW** key on the control panel.

   The system displays the Study screen. If the system displays the Image screen, select the **Study Screen** button.

2. For software versions below 2.0:
   - If the study is stored on a CD, insert the CD into the CD drive, select the **Load** button in the **CD** section of the Study screen to close the CD tray, and then select **CD** in the **Disk** section of the Study screen.
   - If the study is stored on the hard disk, then select **HD** in the **Disk** section of the Study screen.
3. For software versions 2.0 and higher: Select **HD** in the **Disk** section of the Study screen.
4. Select a study from the Study screen.
5. Select the **Image Screen** button.

   The system displays all images from the selected study in the Image screen.

6. Select an image from the Image screen.

   The system outlines the selected image.

7. Print a selected image by selecting the **BW Print** button on the left of the Image screen.

   Note: If the selected image is a clip, then the system stores a copy of the printed clip frame to the study.

   The image is sent to the layout page.

8. To send the layout page(s) to the DICOM Print Queue, select the **Study Screen** button to display the Study screen, select the **DICOM Screen** button to display the DICOM screen, and then select the **Print Page** or **Print All Pages** button in the **DICOM BW Printer Layout**.

   Note: If a layout page becomes full and **Print When Page is Full** is selected in the system presets for DICOM, the system automatically sends the page to the **DICOM Print Queue**. If **Print At End of Exam** is selected in the system presets for DICOM, multiple layout pages can be assembled prior to printing. With either selection, all pages are sent to the **DICOM Print Queue** when the current study is closed.

9. To display the live image screen, select the **Back** button and then select the **Live Screen** button.

Arranging Printer Layout Pages

Printer layout pages allow you to assemble images for printing on the same page. You can delete images from a layout page and rearrange the order of image display on printer layout pages.

When you rearrange images, the system outlines the cut image in yellow and then outlines the selected paste location in blue.

A deleted print image is removed from the printer layout page only. The image remains on the system's hard disk as a part of the study and is displayed in the Image screen. Deleting the print image from the Image screen removes the image from the system's hard disk.

To delete an image from a printer layout page:

Note: This procedure assumes that a current or previous study is open and that at least one print image has been sent to a printer layout page.

1. Select the **DICOM Screen** button from the Study screen.

   The system displays the **DICOM BW Printer Layout** page.

2. Select an image from the layout page.

   The system outlines the selected image.

3. Select the **Delete** button on the layout page.

   The system removes the selected image from the layout page.

4. To display the live image screen, select the **Back** button and then select the **Live Screen** button.

To rearrange print images:

Note: This procedure assumes that a current or previous study is open and that several print images have been sent to at least one printer layout page.

1. Select the **DICOM Screen** button from the Study screen.

   The system displays the **DICOM BW Printer Layout** page.

2. Select an image to be repositioned on the layout page.

   The system outlines the selected image.

3. Select the **Cut** button.

   This image (the cut image) remains in place until you complete the paste operation.

4. Select another image as the paste location.
5. Select the **Paste** button.

   The system inserts the cut image in the paste location.

6. To rearrange images across pages, select the **Cut** button for an image on one page, select the **Next** or **Previous** button to select a different page, select a new paste location, and then select the **Paste** button to insert the image in the paste location on the new page.
7. To display the live image screen, select the **Back** button and then select the **Live Screen** button.

Next
Selects a higher page number.

Previous
Selects a lower page number.

Queue Status Indicators

Queue Status	Description
Queued	The queue entry has been received by the currently displayed queue. The system has not yet initiated the print/store operation.
Succeeded	The system successfully completed the print/store operation.
In Progress	The system is currently completing the print/store operation.
Suspended	Reserved for future use.
Failed	The system has attempted to complete the print/store operation but has timed out. If retries are still available, then the system displays the number of remaining retries in parentheses (for example, "Failed (2)" indicates two remaining retries). The system continues attempts indefinitely if TCP/IP connection to the destination device cannot be initiated (for example, if the ultrasound system is temporarily located away from network connections). If TCP/IP connection can be initiated, then the system stops attempts when retries are no longer available. **Note:** If this status indicator remains and no more retries are available, then ensure that the system presets settings for the connected devices are complete and compatible and then select the **Retry Job** button.

7 Network Export Function

About the Network Export Function

The network export function facilitates the transfer of images and reports (patient studies) from the ultrasound system to a shared folder on a destination computer, such as a workstation, server, or personal computer.

To avoid file conflicts, move the transferred studies from the shared folder on the export host before using the files.

Configuring the Network Export Function

Prerequisite: A working knowledge of Windows networking principles is necessary and beneficial for completing configuration of the network export function.

Configuring the network export function involves setting up the export host and then defining the host and the export host settings on the ultrasound system.

Setting Up the Export Host

The ***export host*** is the destination for the shared files. Examples of export hosts are off-line workstations, servers, and personal computers.

The export host must meet the following prerequisites:

- Windows 2000 or Windows XP operating system
- Compatible remote share access
- Ethernet card that supports TCP/IP

To set up the export host:

Note: For detailed instructions, refer to the user manual for the operating system on the workstation (export host).

1. On the export host, create a shared folder and specify security access settings as required.
2. Locate the following information on the export host and write the information down. This information will be used to define the host and the export host settings on the ultrasound system.

   Note: If the export host uses DHCP (Dynamic Host Configuration Protocol), then the IP address may change frequently. Each time the IP address changes, you must reconfigure the system presets on the ultrasound system with the new IP address.

   – Shared folder name
   – Computer name (if defined by the export host)
   – IP address
   – Subnet mask (not required if using DHCP)
   – Gateway (not required if using DHCP)
   – Account and password used to log onto the export host, including domain name (if applicable)
   – Media type and duplex mode required for connection
3. To connect the export host directly to the ultrasound system, use a cross-over ethernet cable.
4. To connect the export host to the ultrasound system through a hub or switch, use a standard ethernet cable.

Defining and Deleting Settings for the Host and the Export Host

You can define the settings for the host and the export host. You can also delete existing host and export host configurations.

The ***host*** is the ultrasound system. The ***export host*** is the destination for the shared files. Examples of export hosts are off-line workstations, servers, and personal computers.

Use the system presets to access the setup screens and define and delete the settings for the host and the export host.

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Networking

Accessing the Setup Screens

You can access the **Host Setup** screen and the **Export Host Setup** screen.

To access the Host Setup screen:

1. Press the **F6** key on the keyboard to display the **Preset Main Menu** and then select **Networking** on the left of the screen.
   – For software versions 2.0 and higher: The system displays the **Network Export** screen.
   – For software versions below 2.0: The system displays the **Active Setup** screen.
2. To define a new host configuration, select the **New** button on the right of the **Host** line.
3. To edit an existing host configuration, select the configuration from the **Host** drop-down list and then select the **Edit** button on the right of the **Host** line.

To access the Export Host Setup screen:

1. Press the **F6** key on the keyboard to display the **Preset Main Menu** and then select **Networking** on the left of the screen.
   – For software versions 2.0 and higher: The system displays the **Network Export** screen.
   – For software versions below 2.0: The system displays the **Active Setup** screen.
2. To define a new export host configuration, select the **New** button on the right of the **Export Host** line.
3. To edit an existing export host configuration, select the configuration from the **Export Host** drop-down list and then select the **Edit** button on the right of the **Export Host** line.

Defining the Host and the Export Host Settings

You can define the settings for the host and the export host.

To define the host and the export host settings:

Prerequisite: Before configuring the system presets on the ultrasound system, you must set up the export host.

1. Access the **Host Setup** screen and use the keyboard to enter values for the fields on the screen.
2. Save the changes.
   - For software versions 2.0 and higher: Select the **OK** button.

     Note: You must also select the **Save** button on the **Network Export** screen to store all the configuration changes.

     The system redisplays the **Network Export** screen.
   - For software versions below 2.0: Select the **OK** button and then select **Yes** to confirm changes.

     The system redisplays the **Active Setup** screen.
3. Access the **Export Host Setup** screen and use the keyboard to enter values for the fields on the screen.
4. To verify successful connection to the export host, select the **Ping** button.
5. To test writing to the specified shared folder, select the **TestWrite** button.

   Note: If connection is successful but writing is not, then complete this procedure and test writing again. A successful writing test may require cycling power to the system (rebooting the system).
6. Save the changes.
   - For software versions 2.0 and higher: Select the **OK** button.

     Note: You must also select the **Save** button on the **Network Export** screen to store all the configuration changes.

     The system redisplays the **Network Export** screen.
   - For software versions below 2.0: Select the **OK** button and then select **Yes** to confirm changes.

     The system redisplays the **Active Setup** screen.
7. Ensure that the required host and the required export host are activated: Select the host configuration from the **Host** drop-down list and select the export host configuration from the **Export Host** drop-down list. For example, to activate the "archive1" export host configuration, select "archive1" from the **Export Host** drop-down list.

8. Save all configuration changes.
   – For software versions 2.0 and higher: Select the **Save** button at the bottom of the **Network Export** screen
   – For software versions below 2.0: Select the **OK** button from the **Active Setup** screen, select the **Yes** button in the confirmation box to confirm the operation and redisplay the **Preset Main Menu**, and then select the **Save** button from the **Preset Main Menu**.

     The system displays the live image screen.

     A change in host configuration causes the system to reset DIMAQ and display the following message for approximately four minutes:

     "System is rebooting, please wait…"

     The system removes the message from the screen when the DIMAQ reset is complete.

9. Cycle power to the ultrasound system.
   a. From the live image screen, power off (⏻) the ultrasound system.
   b. Wait approximately 20 seconds before powering on (⊙) the ultrasound system.

Deleting the Host and the Export Host Settings

You can delete existing configurations containing host or export host settings.

For software versions 2.0 and higher:

To delete a configuration:

- Select the configuration from the related drop-down list (such as the **Export Host** drop-down list), select the **Delete** button to the right of the selected alias, and then select **OK** to confirm.

For software versions below 2.0:

To delete a configuration:

1. Select the configuration from the related drop-down list and then select the **Edit** button to the right of the selected configuration. For example, to select the "archive1" export host configuration, select "archive1" from the **Export Host** drop-down list.

   The system displays the screen for the selected configuration (**Export Host Setup** or **Host Setup**).

2. Select the **Delete** button and then select **Yes** to confirm changes.

   The system deletes the configuration and exits the configuration screen.

3. Select the **OK** button from the **Active Setup** screen and then select **Yes** to confirm changes.

Fields in the Setup Screens

Fields in the Host Setup Screen

Field	Description
Alias	User-designated name for host.
AE Title	Application Entity Title as configured for DICOM. **Note:** Disregard this field. The system automatically populates this field if the ultrasound system is configured for DICOM (using the **DICOM** category in the **Preset Main Menu**). Otherwise, the system does not use this field.
Host Name	User-designated name for host (you can use the value entered for **Alias**)
MAC Address[1]	Indicates the Media Access Control (MAC) address detected for the host (this field is display only).
Workgroup[2]	Disregard this field.
Use DHCP	When checked (enabled), activates Dynamic Host Control Protocol for the host (ultrasound system). **Note:** Do not configure the host to use DHCP if DICOM is installed. DHCP is not compatible with DICOM.
IP Address	IP address for the host (ultrasound system). **Note:** Disregard this field if DHCP is enabled.
Subnet Mask	Subnet mask for the host (ultrasound system). Typically identical to the subnet mask for the export host. **Note:** Disregard this field if DHCP is enabled.
Default Gateway	Default gateway for the host (ultrasound system). Typically identical to the default gateway for the export host. **Note:** Disregard this field if DHCP is enabled.
Port Number[2]	Port number for the host (ultrasound system). **Note:** Disregard this field if DHCP is enabled.
Media Type	**HardwareDefault** **AUTOSELECT** **100BASETX** **10BASET**
Duplex Mode	**HardwareDefault** **HalfDuplex** **FullDuplex**

[1] Requires software version 2.0 or higher

[2] For software versions below 2.0

Fields in the Export Host Setup Screen

Field	Description
Alias	System-defined "computer name" or user-defined name for the export host.
IP Address[1], **Export Host Name**[2]	IP address of the export host. **Note:** If DHCP is used for the export host, then reconfigure this field when the IP address changes.
Export to PACS[2]	When checked (enabled), specifies the shared folder name "SIEMENS". **Note:** If enabling this field, then ensure that the shared folder on the export host is named "SIEMENS".
Shared Folder	Exact name of the shared folder on the export host, following standard MS Windows conventions for specifying access. **Note:** Disregard this field if **Export to PACS** is enabled.
Account	Account name used to log onto the export host. Examples: "archive1\jsmith" ("computer name" and user name for local account on export host) "jsmith" (user name for local account on export host) "domain1\jsmith" (domain and user name)
Password	Password used to log onto the export host, if applicable. **Note:** This field is case sensitive. The system indicates the status (on/off) of the **Caps Lock** key on the keyboard on the right of the screen.
Ping Timeout in Seconds	Number of seconds after which to stop confirming successful connection.
Ping	Confirm successful connection.
TestWrite	Attempt storing "test" files to the export host.

[1] Requires software version 2.0 or higher

[2] For software versions below 2.0

Sending Studies to the Export Host

You can send studies from the system's hard disk to the selected, configured export host. You can also automatically send a study to the export host when the study is closed and automatically indicate the status of the network connection.

Note: Before using the transferred studies on the export host (destination device), move the studies from the shared folder to avoid file conflicts.

Use the system presets to select and configure the export host, to automatically send studies to the export host as they are closed, and to automatically indicate the status of the network connection.

F6

Networking

To send one or more studies to the export host:

Note: If you send a study that already exists on the export host, then the system overwrites the existing study.

Note: Studies to be sent to the network must be closed.

1. Press the **REVIEW** key on the control panel to display the Study screen.
2. If the system displays the Image screen, then select the **Study Screen** button to display the Study screen.

   The system displays the Study screen.
3. Ensure that **HD** is selected in the **Disk** section of the Study screen.
4. Select one or more studies for export.
5. In the **Network** section of the Study screen, select the export host from the drop-down list and then select **Send**.

   The system indicates successful transfer by displaying **Network** in the **Archived** column listed on the Study screen. The system indicates unsuccessful transfer by displaying errors. Errors are displayed in English.

To automatically send a study to the export host as the study is closed:

F6

Networking
Storage

1. Press the **F6** key on the keyboard to display the **Preset Main Menu**.
2. For software versions 2.0 and higher: Select **Networking** on the left of the screen to display the **Network Export** screen and then select the **Autostore to Network** check box located under the export host line.
3. For software versions below 2.0: Select **Storage** on the left of the screen and then select the **Autostore to Network** check box.

   The system automatically sends each study to the export host when the study is closed.

To automatically indicate the status of the network connection:

F6

Networking
DIMAQ Utility

1. Press the **F6** key on the keyboard to display the **Preset Main Menu**.
2. For software versions 2.0 and higher: Select **Networking** on the left of the screen to display the **Network Export** screen and then select the **Show network status** check box located under the host line.
3. For software versions below 2.0: Select **DIMAQ Utility** on the left of the screen to display the **DIMAQ Utility** screen and then select the **Autostore to Network** check box located in the **Network** section.

   The system automatically indicates the status of the network connection in the **Network** section of the Study screen.

Format of Export Data

Images and reports are transferred in files to the hard disk of a remotely hosted shared folder. The export format mirrors the hard disk (HD) format of the ultrasound imaging system. Standard Windows 2000 and compatible remote share access file formats are supported.

The remote host maintains a folder for each patient (named by patient ID). Study folders within the patient folder are labeled with the date and time of the study, using the date format *MM.DD.YYYY*, where *YYYY* is the year, *MM* is the month, and *DD* is the day, and the time format *HH.MM.SS*, where *HH* is the hour, *MM* is the minute, and *SS* is the second. The date format used to name the study folders is unrelated to the date format set in the system presets. Within each study folder are subsequent folders for images and reports. Images have subfolders to hold contents of application proprietary data for re-launch.

- Single frame images are stored in the images folder as .TIF, .RLE, or uncompressed files.
- Reports are stored in the reports folder. The format is provided by the host software.
- To retain measurement accuracy, measurements must include a calibration (.CAL) file of the same name in each corresponding image folder. The calibration file specifies video format (NTSC, PAL, or SVGA) and pixel spacing. (Pixel aspect is not always 1:1.)

8 Data Transmission Specifications

RS-232C Serial Port

The system has one RS-232C serial port for connecting to a PC or a serial printer.

⚠ **WARNING:** Accessory equipment connected to the analog and digital interfaces must be certified according to the respective EN and IEC standards (for example, EN 60950 and IEC 60950 for data processing equipment and EN 60601-1 and IEC 60601-1 for medical equipment). Furthermore, all configurations shall comply with the system standards EN 60601-1-1 and IEC 60601-1-1. Anyone who connects additional equipment to the signal input or signal output ports configures a medical system and is therefore responsible that the system complies with the requirements of the system standards EN 60601-1-1 and IEC 60601-1-1. Siemens can only guarantee the performance and safety of the devices listed in the Accessories and Options chapter. If in doubt, consult Siemens service department or your local Siemens representative.

Note: Siemens does not support or service any external devices connected to the RS-232C interface. Siemens does not assume responsibility for functionality beyond the scope of this specification.

System Reference

Accessories and Options Ch 2

Configuring the Port

Use the system presets to select the destination for data sent through serial port.

F6

Peripheral
▶External RS-232C Port

Note: Siemens does not specifically recommend any particular communication or analysis software; please contact a local vendor for assistance with interpretation and analysis of the data transmitted by the ultrasound imaging system.

Menu Selection:	Options	Allows you to:
▶External RS-232C Port	PC2	Send OB report data through the ultrasound system's serial port to a PC.
	Laser Printer	Send report data through the ultrasound system's RS-232C port to a laser printer, using the HP PCL 3 protocol. This option includes the graphics (such as pictograms or growth graphs) contained in a report.
	Off	Disables the RS-232C Serial port.

RS-232C Settings

- 1 start bit
- 8 data bits
- 1 stop bit
- Parity, none
- 9600 baud rate

Serial Port Pin Assignments

The following table indicates the pins used on a 9-pin D-Sub female connector on the ultrasound imaging system and the PC or printer, and a 9-pin D-Sub male connector on a connecting cable.

Ultrasound System Pin Number	Ultrasound System Signal Name
1	N/A
2	RXD (received data)
3	TXD (transmitted data)
4	DTR (data terminal ready)
5	SG (signal ground)
6	DSR (data set ready)
7	RTS (request to send)
8	CTS (clear to send)
9	N/A

Transmitting OB Report Data

Note: You must use the system presets to select the **Peripheral** item and then the **PC2** setting for the **External RS-232C Port** setup option. You cannot transmit growth graphs with the **PC2** setting.

F6

Peripheral
▶External RS-232C Port

To begin transmitting data from the ultrasound imaging system, access the OB report by pressing the **F2 Report** key and then press the **Send Report** button on the report screen.

The ultrasound system transmits the report to the destination device, including patient information (from the Patient Registration form) and the report measurement data. The layout of the transmitted data is similar to a report sent to a laser printer.

9 Obstetrical References

Parameter, author

Mean Gestational Sac Diameter, Hellman

Hellman LM, Kobayashi M, Fillisti L, Lavenhar M, Cromb E. "Growth and development of the human fetus prior to the twentieth week of gestation." *American Journal of Obstetrics and Gynecology* 103(6):789, 1969.

MA(MSDmm)= (MSD + 25.43)/7.02

MSD mm	wks	days	± 2SD	MSD mm	wks	days	± 2SD	MSD mm	wks	days	± 2SD	MSD mm	wks	days	± 2SD	MSD mm	wks	days	± 2SD	MSD mm	wks	days	± 2SD
17.0	06	00	0	24.2	07	00	0	31.3	08	01	0	39.2	09	01	0	46.3	10	02	0	54.2	11	02	0
17.1	06	00	0	24.3	07	01	0	32.2	08	01	0	39.3	09	02	0	47.2	10	02	0	54.3	11	03	0
17.2	06	01	0	25.2	07	01	0	32.3	08	02	0	40.2	09	02	0	47.3	10	03	0	55.2	11	03	0
18.1	06	01	0	25.3	07	02	0	33.2	08	02	0	40.3	09	03	0	48.2	10	03	0	55.3	11	04	0
18.2	06	02	0	26.2	07	02	0	33.3	08	03	0	41.2	09	03	0	48.3	10	04	0	56.3	11	04	0
19.1	06	02	0	26.3	07	03	0	34.2	08	03	0	41.3	09	04	0	49.2	10	04	0	56.4	11	05	0
19.2	06	03	0	27.2	07	03	0	34.3	08	04	0	42.2	09	04	0	49.3	10	05	0	57.3	11	05	0
20.1	06	03	0	27.3	07	04	0	35.2	08	04	0	42.3	09	05	0	50.2	10	05	0	57.4	11	06	0
20.2	06	04	0	28.2	07	04	0	35.3	08	05	0	43.2	09	05	0	50.3	10	06	0	58.3	11	06	0
21.2	06	04	0	28.3	07	05	0	36.2	08	05	0	43.3	09	06	0	51.2	10	06	0	58.4	12	00	0
21.3	06	05	0	29.2	07	05	0	36.3	08	06	0	44.2	09	06	0	51.3	11	00	0	59.3	12	00	0
22.2	06	05	0	29.3	07	06	0	37.2	08	06	0	44.3	10	00	0	52.2	11	00	0	59.4	12	01	0
22.3	06	06	0	30.2	07	06	0	37.3	09	00	0	45.2	10	00	0	52.3	11	01	0	60.0	12	01	0
23.2	06	06	0	30.3	08	00	0	38.2	09	00	0	45.3	10	01	0	53.2	11	01	0				
23.3	07	00	0	31.2	08	00	0	38.3	09	01	0	46.2	10	01	0	53.3	11	02	0				

Mean Gestational Sac Diameter, Rempen

Rempen A. "Biometrie in der Frühgravidität (I. Trimenon) (Biometry in Early Pregnancy (1st Trimester))." *Der Frauenarzt* 32:425, 1991.

MSD mm	wks	days	± 2SD	MSD mm	wks	days	± 2SD	MSD mm	wks	days	± 2SD	MSD mm	wks	days	± 2SD	MSD mm	wks	days	± 2SD	MSD mm	wks	days	± 2SD
02.0	04	06	12	14.0	06	02	12	26.0	07	04	12	38.0	09	01	12	50.0	10	05	12	62.0	12	03	12
03.0	05	00	12	15.0	06	02	12	27.0	07	05	12	39.0	09	02	12	51.0	10	06	12	63.0	12	04	12
04.0	05	01	12	16.0	06	03	12	28.0	07	06	12	40.0	09	03	12	52.0	11	00	12	64.0	12	05	12
05.0	05	02	12	17.0	06	04	12	29.0	08	00	12	41.0	09	04	12	53.0	11	01	12	65.0	12	06	12
06.0	05	02	12	18.0	06	05	12	30.0	08	01	12	42.0	09	05	12	54.0	11	02	12	66.0	13	00	12
07.0	05	03	12	19.0	06	06	12	31.0	08	02	12	43.0	09	06	12	55.0	11	03	12	67.0	13	01	12
08.0	05	04	12	20.0	06	06	12	32.0	08	03	12	44.0	09	06	12	56.0	11	04	12	68.0	13	02	12
09.0	05	05	12	21.0	07	00	12	33.0	08	03	12	45.0	10	00	12	57.0	11	05	12	69.0	13	03	12
10.0	05	05	12	22.0	07	01	12	34.0	08	04	12	46.0	10	01	12	58.0	11	06	12	70.0	13	04	12
11.0	05	06	12	23.0	07	02	12	35.0	08	05	12	47.0	10	02	12	59.0	12	00	12	71.0	13	05	12
12.0	06	00	12	24.0	07	03	12	36.0	08	06	12	48.0	10	03	12	60.0	12	01	12	72.0	14	00	12
13.0	06	01	12	25.0	07	04	12	37.0	09	00	12	49.0	10	04	12	61.0	12	02	12	73.0	14	01	12

Gestational Sac, Tokyo

Masuda H, Shinozuka N, Okai T, Mizuno M. "Diagnosis of the Week of Pregnancy and Prognosis." *Perinatal Care* 8:719-726.

GS mm	mean days	± days	GS mm	mean days	± days	GS mm	mean days	± days	GS mm	mean days	± days	GS mm	mean days	± days	GS mm	mean days	± days
10.0	28	7	20.0	41	14	30.0	52	14	40.0	62	---	50.0	72	---	60.0	79	---
11.0	29	7	21.0	42	14	31.0	54	14	41.0	63	---	51.0	72	---	61.0	80	---
12.0	30	7	22.0	43	14	32.0	55	14	42.0	64	---	52.0	73	---	62.0	81	---
13.0	32	14	23.0	45	14	33.0	56	---	43.0	65	---	53.0	74	---	63.0	82	---
14.0	33	14	24.0	46	14	34.0	57	---	44.0	66	---	54.0	75	---	64.0	82	---
15.0	34	14	25.0	47	14	35.0	58	---	45.0	67	---	55.0	76	---	65.0	83	---
16.0	36	14	26.0	48	14	36.0	59	---	46.0	68	---	56.0	76	---	66.0	83	---
17.0	37	14	27.0	49	14	37.0	60	---	47.0	69	---	57.0	77	---	67.0	84	---
18.0	38	14	28.0	50	14	38.0	61	---	48.0	70	---	58.0	78	---			
19.0	40	14	29.0	51	14	39.0	62	---	49.0	71	---	59.0	79	---			

Crown Rump Length, Hadlock

Hadlock FP, Shah YP, Kanon DJ, Lindsey JV. "Fetal Crown-Rump Length: Reevaluation of Relation to Menstrual Age (5-18 weeks) with High-Resolution Real-Time US." *Radiology* 182(2):501, 1992.

$LN (MA) = 1.684969 + (0.315646 * CRL) - (0.049306 * CRL^2) + (0.004057 * CRL^3) - (0.000120456 * CRL^4)$

±2 Standard Deviations = 8.826%

CRL			±	CRL			±	CRL			±	CRL			±	CRL			±	CRL			±
mm	wks	days	2SD	mm	wks	days	2SD	mm	wks	days	2SD	mm	wks	days	2SD	mm	wks	days	mm	wks	days		2SD
2.0	05	05	04	14.6	07	06	05	30.7	10.	00	06	54.5	12	01	07	81.0	14	01	09	103.5	16	02	10
2.3	05	05	04	15.5	07	06	05	31.9	10	00	06	55.3	12	01	07	82.6	14	01	09	104.8	16	02	10
2.4	05	06	04	15.6	08	00	05	32.0	10	01	06	55.4	12	01	08	82.7	14	02	09	104.9	16	03	10
3.1	05	06	04	16.4	08	00	05	33.2	10	01	06	56.3	12	01	08	84.3	14	02	09	106.2	16	03	10
3.9	06	00	04	16.5	07	01	05	33.3	10	02	06	56.4	12	02	08	84.4	14	03	09	106.3	16	04	10
3.9	06	00	04	17.4	08	01	05	34.6	10	02	06	58.3	12	02	08	85.9	14	03	09	107.5	16	04	10
4.0	06	01	04	17.5	08	02	05	34.7	10	03	06	58.4	12	03	08	86.0	14	04	09	107.6	16	05	10
4.8	06	01	04	18.4	08	02	01	36.0	10	03	06	60.2	12	03	08	87.5	14	04	09	108.9	16	05	10
4.9	06	02	04	18.5	08	03	05	36.1	10	04	06	60.3	12	04	08	87.6	14	05	09	109.0	16	06	10
5.6	06	02	04	19.4	08	03	05	36.2	10	04	06	62.2	12	04	08	89.1	14	05	09	110.2	16	06	10
5.7	06	03	04	19.5	08	04	05	36.3	10	04	07	62.3	12	05	08	89.2	14	06	09	110.3	17	00	10
6.5	06	03	04	20.4	08	04	05	37.4	10	04	07	64.2	12	05	08	90.6	14	06	09	110.9	17	00	10
6.6	06	04	04	20.5	08	05	05	37.5	10	05	07	64.3	12	06	08	90.7	15	00	09	111.0	17	00	11
7.4	06	04	04	21.4	08	05	05	38.9	10	05	07	66.2	12	06	08	92.1	15	00	09	111.6	17	00	11
7.5	06	05	04	21.5	08	06	05	39.0	10	06	07	66.3	13	00	08	92.2	15	01	09	111.7	17	01	11
8.2	06	05	04	22.3	08	06	05	40.4	10	06	07	68.1	13	00	08	936	15	01	09	113.0	17	01	11
8.3	06	06	04	22.4	08	06	06	40.5	11	00	07	68.2	13	01	08	93.7	15	02	09	113.1	17	02	11
9.1	06	06	04	22.5	08	06	06	42.0	11	00	07	70.0	13	01	08	95.0	15	02	09	114.3	17	02	11
9.2	07	00	04	22.6	09	00	06	42.1	11	01	07	70.1	13	02	08	95.1	15	03	09	114.4	17	03	11
10.0	07	00	04	23.6	09	00	06	43.6	11	01	07	71.9	13	02	08	95.2	15	03	09	115.7	17	03	11
10.1	07	01	04	23.7	09	01	06	43.7	11	02	07	72.0	13	03	08	95.3	15	03	10	115.8	17	04	11
10.9	07	01	04	24.7	09	01	06	45.3	11	02	07	73.8	13	03	08	96.5	15	03	10	117.2	17	04	11
11.0	07	02	04	24.8	09	02	06	45.4	11	03	07	73.9	13	04	08	96.6	15	04	10	117.3	17	05	11
11.3	07	02	04	25.8	09	02	06	47.0	11	03	07	75.6	13	04	08	97.9	15	04	10	118.6	17	05	11
11.4	07	02	05	25.9	09	03	06	47.1	11	04	07	75.7	13	05	08	98.0	15	05	10	118.7	17	06	11
11.8	07	02	05	27.0	09	03	06	48.8	11	04	07	77.1	13	05	08	99.3	15	05	10	120.1	17	06	11
11.9	07	03	05	27.1	09	04	06	48.9	11	05	07	77.2	13	05	09	99.4	15	06	10	120.2	18	00	11
12.7	07	03	05	28.1	09	04	06	50.6	11	05	07	77.4	13	05	09	100.7	15	06	10	121.1	18	00	11
12.8	07	04	05	28.2	09	05	06	50.7	11	06	07	77.5	13	06	09	100.8	16	00	10				
13.6	07	04	05	29.4	09	05	06	52.5	11	06	07	79.2	13	06	09	102.1	16	00	10				
13.7	07	05	05	29.5	09	06	06	52.6	12	00	07	79.3	14	00	09	102.2	16	01	10				
14.5	07	05	05	30.6	09	06	06	54.4	12	00	07	80.9	14	00	09	103.4	16	01	10				

Crown Rump Length, Robinson

Robinson HP and Fleming JEE. "A critical evaluation of sonar 'crown-rump length' measurements." *British Journal of Obstetrics and Gynaecology* 82:702, 1975.

$MA= (8.052 * CRL^{½} + 23.73)/7$

CRL			±	CRL			±	CRL			±	CRL			±	CRL			±	CRL			±
mm	wks	days	2SD	mm	wks	days	2SD	mm	wks	days	2SD	mm	wks	days	2SD	mm	wks	days	2SD	mm	wks	days	2SD
6.7	06	03	05	13.7	07	05	05	23.2	09	00	05	35.2	10	02	05	49.8	11	04	05	66.8	12	06	05
7.3	06	03	05	14.6	07	05	05	24.3	09	00	05	36.6	10	02	05	51.4	11	04	05	68.7	12	06	05
7.4	06	04	05	14.7	07	06	05	24.4	09	01	05	36.7	10	03	05	51.5	11	05	05	68.8	13	00	05
7.9	06	04	05	15.5	07	06	05	25.6	09	01	05	38.2	10	03	05	53.2	11	05	05	70.8	13	00	05
8.0	06	05	05	15.6	08	00	05	25.7	09	02	05	38.3	10	04	05	53.3	11	06	05	70.9	13	01	05
8.7	06	05	05	16.5	08	00	05	26.9	09	02	05	39.7	10	04	05	55.1	11	06	05	72.9	13	01	05
8.8	06	06	05	16.6	08	01	05	27.0	09	03	05	39.8	10	05	05	55.2	12	00	05	73.0	13	02	05
9.4	06	06	05	17.5	08	01	05	28.2	09	03	05	41.3	10	05	05	56.9	12	00	05	75.0	13	02	05
9.5	07	00	05	17.6	08	02	05	28.3	09	04	05	41.4	10	06	05	57.0	12	01	05	75.1	13	03	05
10.2	07	00	05	18.6	08	02	05	29.5	09	04	05	42.9	10	06	05	58.8	12	01	05	77.2	13	03	05
10.3	07	01	05	18.7	08	03	05	29.6	09	05	05	43.0	11	00	05	58.9	12	02	05	77.3	13	04	05
11.0	07	01	05	19.7	08	03	05	30.9	09	05	05	44.5	11	00	05	60.7	12	02	05	79.4	13	04	05
11.1	07	02	05	19.8	08	04	05	31.0	09	06	05	44.6	11	01	05	60.8	12	03	05	79.5	13	05	05
11.8	07	02	05	20.8	08	04	05	32.3	09	06	05	46.2	11	01	05	62.7	12	03	05	81.6	13	05	05
11.9	07	03	05	20.9	08	05	05	32.4	10	00	05	46.3	11	02	05	62.8	12	04	05	81.7	13	06	05
12.7	07	03	05	22.0	08	05	05	33.7	10	00	05	47.9	11	02	05	64.7	12	04	05	82.4	13	06	05
12.8	07	04	05	22.1	08	06	05	33.8	10	01	05	48.0	11	03	05	64.8	12	05	05				
13.6	07	04	05	23.1	08	06	05	35.1	10	01	05	49.7	11	03	05	66.7	12	05	05				

Crown Rump Length, Hansmann

Hansmann M, Hackelöer B-J, Staudach A. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, 1985, p. 439.

CRL			±	CRL			±	CRL			±	CRL			±	CRL			±	CRL			±
mm	wks	days	2SD	mm	wks	days	2SD	mm	wks	days	2SD	mm	wks	days	2SD	mm	wks	days	2SD	mm	wks	days	2SD
6.0	06	01	06	17.0	08	03	06	32.0	10	03	08	54.0	12	03	09	86.0	14	04	12	123.0	18	00	14
7.0	06	02	07	18.0	08	04	07	34.0	10	05	07	56.0	12	04	09	90.0	14	06	12	126.0	18	02	15
8.0	06	04	06	19.0	08	05	07	36.0	10	06	08	58.0	12	05	09	93.0	15	01	12	130.0	18	06	14
9.0	06	06	07	20.0	08	06	07	38.0	11	01	08	60.0	12	06	09	96.0	15	03	12	133.0	19	01	15
10.0	07	00	07	21.0	09	00	07	40.0	11	02	08	63.0	13	00	10	100.0	15	05	12	136.0	19	04	16
11.0	07	02	06	22.0	09	01	07	42.0	11	03	08	66.0	13	02	10	103.0	16	00	13	140.0	20	00	16
12.0	07	03	07	23.0	09	02	07	44.0	11	04	09	70.0	13	03	11	106.0	16	02	13	143.0	20	03	16
13.0	07	04	07	24.0	09	03	07	46.0	11	06	08	73.0	13	05	10	110.0	16	04	14	146.0	20	06	16
14.0	07	06	07	26.0	09	05	07	48.0	12	00	09	76.0	13	06	11	113.0	17	00	14	150.0	21	03	16
15.0	08	00	07	28.0	10	00	08	50.0	12	01	09	80.0	14	01	11	116.0	17	02	14				
16.0	08	02	06	30.0	10	02	07	52.0	12	02	09	83.0	14	02	12	120.0	17	04	14				

Crown Rump Length, Lasser

Lasser DM, Peisner DB, Vollebergh J, Timor-Tritsch I. "First-trimester fetal biometry using transvaginal sonography." *Ultrasound in Obstetrics and Gynecology* 3:104, 1993.

CRL mm	wks	days	± 2SD	CRL mm	wks	days	± 2SD	CRL mm	wks	days	± 2SD	CRL mm	wks	days	± 2SD	CRL mm	wks	days	± 2SD	CRL mm	wks	days	± 2SD
02.3	06	00	04	11.1	07	03	04	21.7	08	06	04	34.1	10	02	04	48.4	11	05	04	64.5	13	01	04
03.1	06	01	04	12.0	07	04	04	22.8	09	00	04	35.4	10	03	04	49.4	11	06	04	66.2	13	02	04
03.9	06	02	04	13.0	07	05	04	24.0	09	01	04	36.8	10	04	04	51.5	12	00	04	68.0	13	03	04
04.7	06	03	04	14.0	07	06	04	25.2	09	02	04	38.2	10	05	04	53.0	12	01	04	69.7	13	04	04
05.6	06	04	04	15.1	08	00	04	26.4	09	03	04	39.6	10	06	04	54.6	12	02	04	71.5	13	05	04
06.4	06	05	04	16.2	08	01	04	27.7	09	04	04	41.0	11	00	04	56.2	12	03	04	73.3	13	06	04
07.3	06	06	04	17.2	08	02	04	28.9	09	05	04	42.5	11	01	04	57.9	12	04	04	75.1	14	00	04
08.2	07	00	04	18.3	08	03	04	30.2	09	06	04	43.9	11	02	04	59.5	12	05	04	76.9	14	01	04
09.1	07	01	04	19.4	08	04	04	31.5	10	00	04	45.4	11	03	04	61.1	12	06	04				
10.1	07	02	04	20.5	08	05	04	32.8	10	01	04	46.9	11	04	04	62.8	13	00	04				

Crown Rump Length, Tokyo

Masuda H, Shinozuka N, Okai T, Mizuno M. "Diagnosis of the Week of Pregnancy and Prognosis." *Perinatal Care* 8:719-726.

CRL mm	mean days	± days	CRL mm	mean days	± days	CRL mm	mean days	± days	CRL mm	mean days	± days	CRL mm	mean days	± days	CRL mm	mean days	± days
12.0	49	---	25.0	68	7	38.0	77	7	51.0	87	7	64.0	94	7	77.0	100	14
13.0	52	---	26.0	69	7	39.0	78	7	52.0	87	7	65.0	95	7	78.0	100	14
14.0	54	---	27.0	70	7	40.0	79	7	53.0	88	7	66.0	95	7	79.0	101	14
15.0	56	14	28.0	71	7	41.0	80	7	54.0	89	7	67.0	96	7	80.0	101	14
16.0	58	14	29.0	71	7	42.0	81	7	55.0	89	7	68.0	96	14	81.0	102	14
17.0	60	14	30.0	72	7	43.0	81	7	56.0	90	7	69.0	97	14	82.0	102	14
18.0	61	14	31.0	73	7	44.0	82	7	57.0	90	7	70.0	97	14	83.0	103	14
19.0	62	14	32.0	74	7	45.0	83	7	58.0	91	7	71.0	98	14	84.0	103	14
20.0	63	7	33.0	74	7	46.0	84	7	59.0	92	7	72.0	98	14	85.0	104	14
21.0	64	7	34.0	75	7	47.0	84	7	60.0	92	7	73.0	98	14	86.0	104	14
22.0	65	7	35.0	75	7	48.0	85	7	61.0	93	7	74.0	99	14	87.0	105	14
23.0	66	7	36.0	76	7	49.0	86	7	62.0	93	7	75.0	99	14	88.0	105	14
24.0	67	7	37.0	76	7	50.0	86	7	63.0	94	7	76.0	100	14			

Crown Rump Length, Osaka

Aoki M, Yamada M. "Examining Fetal Growth." *Obstetrics and Gynecology* 47:547-556, 1983.

CRL mm	mean days	± days	CRL mm	mean days	± days	CRL mm	mean days	± days	CRL mm	mean days	± days	CRL mm	mean days	± days	CRL mm	mean days	± days
8.0	48	7	18.0	61	7	28.0	69	7	38.0	75	7	48.0	81	7	58.0	87	7
9.0	50	7	19.0	62	7	29.0	69	7	39.0	76	7	49.0	82	7	59.0	87	7
10.0	52	7	20.0	63	7	30.0	70	7	40.0	76	7	50.0	82	7	60.0	88	7
11.0	53	7	21.0	64	7	31.0	71	7	41.0	77	7	51.0	83	7	61.0	89	7
12.0	55	7	22.0	64	7	32.0	71	7	42.0	78	7	52.0	83	7	62.0	89	7
13.0	56	7	23.0	65	7	33.0	72	7	43.0	78	7	53.0	84	7	63.0	90	7
14.0	57	7	24.0	66	7	34.0	72	7	44.0	79	7	54.0	85	7	64.0	91	7
15.0	58	7	25.0	67	7	35.0	73	7	45.0	79	7	55.0	85	7			
16.0	59	7	26.0	67	7	36.0	74	7	46.0	80	7	56.0	86	7			
17.0	60	7	27.0	68	7	37.0	74	7	47.0	81	7	57.0	86	7			

Crown Rump Length, JSUM

Japan Society of Ultrasonics in Medicine. "Standardization of Fetometry and Official Announcement of Diagnostic Guidelines." *J. Med. Ultrasonics* 28:844-872, 2001.

CRL mm	- 1SD	days	+ 1SD	CRL mm	- 1SD	days	± 1SD	CRL mm	- 1SD	days	+ 1SD	CRL mm	- 1SD	days	+ 1SD	CRL mm	- 1SD	days	+ 1SD	CRL mm	- 1SD	days	+ 1SD
14.0	3	57	5	19.0	3	62	5	24.0	3	66	5	29.0	3	70	5	34.0	3	74	4	39.0	3	77	4
15.0	3	58	5	20.0	3	63	5	25.0	3	67	5	30.0	3	71	5	35.0	3	75	4	40.0	3	78	4
16.0	3	59	5	21.0	3	64	5	26.0	3	68	5	31.0	3	72	4	36.0	3	75	4	41.0	3	79	3
17.0	3	60	5	22.0	4	65	5	27.0	3	69	5	32.0	3	73	4	37.0	3	76	4	42.0	3	79	4
18.0	3	61	5	23.0	3	65	5	28.0	4	70	4	33.0	3	73	5	38.0	3	77	4	43.0	3	80	3

Crown Rump Length, ASUM

Westerway SC. "Ultrasonic Fetal Measurements: New Australian Standards for the New Millennium." *Aust NZ J Obstet Gynaecol* 40:3:297-302, 2000.

CRL mm	days	CRL mm	days	CRL mm	days	CRL mm	days	CRL mm	days	CRL mm	days
0.1	37	15.0	53	30.0	66	45.0	77	60.0	86	75.0	93
1.0	38	16.0	53	31.0	67	46.0	78	61.0	86	76.0	93
2.0	39	17.0	54	32.0	67	47.0	78	62.0	87	77.0	93
3.0	40	18.0	55	33.0	68	48.0	79	63.0	87	78.0	94
4.0	41	19.0	56	34.0	69	49.0	80	64.0	88	79.0	94
5.0	42	20.0	57	35.0	70	50.0	80	65.0	88	80.0	94
6.0	43	21.0	58	36.0	71	51.0	81	66.0	89	81.0	95
7.0	45	22.0	59	37.0	71	52.0	81	67.0	89	82.0	95
8.0	46	23.0	60	38.0	72	53.0	82	68.0	90	83.0	95
9.0	47	24.0	61	39.0	73	54.0	83	69.0	90	84.0	96
10.0	48	25.0	62	40.0	74	55.0	83	70.0	91	85.0	96
11.0	49	26.0	63	41.0	74	56.0	84	71.0	91	86.0	96
12.0	50	27.0	63	42.0	75	57.0	84	72.0	91	87.0	96
13.0	51	28.0	64	43.0	76	58.0	85	73.0	92		
14.0	52	29.0	65	44.0	76	59.0	85	74.0	92		

Biparietal Diameter, Hadlock

Hadlock FP, Deter RL, Harrist RB, Park SK. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters." *Radiology* 152:497, 1984.

MA= 9.54 + 1.482 *(BPD) + 0.1676 *(BPD^2)

±2 Standard Deviations:		
	12-18 wk ± 1.19 wk (8 days)	30-36 wk ± 3.08 wk (22 days)
	18-24 wk ± 1.73 wk (12 days)	36-42 wk ± 3.20 wk (22 days)
	24-30 wk ± 2.18 wk (15 days)	

BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD
15.0	12	01	08	36.6	17	01	08	53.4	22	02	12	67.9	27	02	15	80.6	32	03	22	92.3	37	03	22
15.3	12	01	08	36.7	17	02	08	53.7	22	02	12	68.0	27	03	15	80.9	32	03	22	92.4	37	04	22
15.4	12	02	08	37.1	17	02	08	53.8	22	03	12	68.3	27	03	15	81.0	32	04	22	92.6	37	04	22
16.0	12	02	08	37.2	17	03	08	54.2	22	03	12	68.4	27	04	15	81.2	32	04	22	92.7	37	05	22
16.1	12	03	08	37.6	17	03	08	54.3	22	04	12	68.7	27	04	15	81.3	32	05	22	92.9	37	05	22
16.7	12	03	08	37.7	17	04	08	54.6	22	04	12	68.8	27	05	15	81.5	32	05	22	93.0	37	06	22
16.8	12	04	08	38.1	17	04	08	54.7	22	05	12	69.1	27	05	15	81.6	32	06	22	93.2	37	06	22
17.4	12	04	08	38.2	17	05	08	55.0	22	05	12	69.2	27	06	15	81.9	32	06	22	93.3	38	00	22
17.5	12	05	08	38.7	17	05	08	55.1	22	06	12	69.4	27	06	15	82.0	33	00	22	93.5	38	00	22
18.1	12	05	08	38.8	17	06	08	55.5	22	06	12	69.5	28	00	15	82.2	33	00	22	93.6	38	01	22
18.2	12	06	08	39.2	17	06	08	55.6	23	00	12	69.8	28	00	15	82.3	33	01	22	93.8	38	01	22
18.8	12	06	08	39.3	18	00	12	55.9	23	00	12	69.9	28	01	15	82.5	33	01	22	93.9	38	02	22
18.9	13	00	08	39.7	18	00	12	56.0	23	01	12	70.2	28	01	15	82.6	33	02	22	94.1	38	02	22
19.5	13	00	08	39.8	18	01	12	56.3	23	01	12	70.3	28	02	15	82.9	33	02	22	94.2	38	03	22
19.6	13	01	08	40.2	18	01	12	56.4	23	02	12	70.6	28	02	15	83.0	33	03	22	94.4	38	03	22
20.1	13	01	08	40.3	18	02	12	56.7	23	02	12	70.7	28	03	15	83.2	33	03	22	94.5	38	04	22
20.2	13	02	08	40.7	18	02	12	56.8	23	03	12	70.9	28	03	15	83.3	33	04	22	94.7	38	04	22
20.8	13	02	08	40.8	18	03	12	57.1	23	03	12	71.0	28	04	15	83.5	33	04	22	94.8	38	05	22
20.9	13	03	08	41.2	18	03	12	57.2	23	04	12	71.3	28	04	15	83.6	33	05	22	95.0	38	05	22
21.4	13	03	08	41.3	18	04	12	57.6	23	04	12	71.4	28	05	15	83.9	33	05	22	95.1	38	06	22
21.5	13	04	08	41.7	18	04	12	57.7	23	05	12	71.7	28	05	15	84.0	33	06	22	95.3	38	06	22
22.1	13	04	08	41.8	18	05	12	58.0	23	05	12	71.8	28	06	15	84.2	33	06	22	95.4	39	00	22
22.2	13	05	08	42.2	18	05	12	58.1	23	06	12	72.0	28	06	15	84.3	34	00	22	95.6	39	00	22
22.7	13	05	08	42.3	18	06	12	58.4	23	06	12	72.1	29	00	15	84.5	34	00	22	95.7	39	01	22
22.8	13	06	08	42.7	18	06	12	58.5	24	00	15	72.4	29	00	15	84.6	34	01	22	96.0	39	01	22
23.4	13	06	08	42.8	19	00	12	58.8	24	00	15	72.5	29	01	15	84.9	34	01	22	96.1	39	02	22
23.5	14	00	08	43.2	19	00	12	58.9	24	01	15	72.8	29	01	15	85.0	34	02	22	96.3	39	02	22
24.0	14	00	08	43.3	19	01	12	59.2	24	01	15	72.9	29	02	15	85.2	34	02	22	96.4	39	03	22
24.1	14	01	08	43.6	19	01	12	59.3	24	02	15	73.1	29	02	15	85.3	34	03	22	96.6	39	03	22
24.6	14	01	08	43.7	19	02	12	59.6	24	02	15	73.2	29	03	15	85.5	34	03	22	96.7	39	04	22
24.7	14	02	08	44.1	19	02	12	59.7	24	03	15	73.5	29	03	15	85.6	34	04	22	96.9	39	04	22
25.2	14	02	08	44.2	19	03	12	60.0	24	03	15	73.6	29	04	15	85.9	34	04	22	97.0	39	05	22
25.3	14	03	08	44.6	19	03	12	60.1	24	04	15	73.8	29	04	15	86.0	34	05	22	97.2	39	05	22
25.8	14	03	08	44.7	19	04	12	60.5	24	04	15	73.9	29	05	15	86.2	34	05	22	97.3	39	06	22
25.9	14	04	08	45.1	19	04	12	60.6	24	05	15	74.2	29	05	15	86.3	34	06	22	97.5	39	06	22
26.4	14	04	08	45.2	19	05	12	60.9	24	05	15	74.3	29	06	15	86.5	34	06	22	97.6	40	00	22
26.5	14	05	08	45.6	19	05	12	61.0	24	06	15	74.6	29	06	15	86.6	35	00	22	97.8	40	00	22
27.0	14	05	08	45.7	19	06	12	61.3	24	06	15	74.7	30	00	22	86.8	35	00	22	97.9	40	01	22
27.1	14	06	08	46.0	19	06	12	61.4	25	00	15	74.9	30	00	22	86.9	35	01	22	98.1	40	01	22
27.6	14	06	08	46.1	20	00	12	61.7	25	00	15	75.0	30	01	22	87.2	35	01	22	98.2	40	02	22
27.7	15	00	08	46.5	20	00	12	61.8	25	01	15	75.3	30	01	22	87.3	35	02	22	98.4	40	02	22
28.2	15	00	08	46.6	20	01	12	62.1	25	01	15	75.4	30	02	22	87.5	35	02	22	98.5	40	03	22
28.3	15	01	08	47.0	20	01	12	62.2	25	02	15	75.6	30	02	22	87.6	35	03	22	98.7	40	03	22
28.8	15	01	08	47.1	10	02	12	62.5	25	02	15	75.7	30	03	22	87.8	35	03	22	98.8	40	04	22
28.9	15	02	08	47.4	20	02	12	62.6	25	03	15	76.0	30	03	22	87.9	35	04	22	99.0	40	04	22
29.4	15	02	08	47.5	20	03	12	62.9	25	03	15	76.1	30	04	22	88.1	35	04	22	99.1	40	05	22
29.5	15	03	08	47.9	20	03	12	63.0	25	04	15	76.3	30	04	22	88.2	35	05	22	99.3	40	05	22
30.0	15	03	08	48.0	20	04	12	63.3	25	04	15	76.4	30	05	22	88.5	35	05	22	99.4	40	06	22
30.1	15	04	08	48.4	20	04	12	63.4	25	05	15	76.7	30	05	22	88.6	35	06	22	99.6	40	06	22
30.5	15	04	08	48.5	20	05	12	63.7	25	05	15	76.8	30	06	22	88.8	35	06	22	99.7	41	00	22
30.6	15	05	08	48.8	20	05	12	63.8	25	06	15	77.0	30	06	22	88.9	36	00	22	99.8	41	00	22
31.1	15	05	08	48.9	20	06	12	64.1	25	06	15	77.1	31	00	22	89.1	36	00	22	99.9	41	01	22
31.2	15	06	08	49.3	20	06	12	64.2	26	00	15	77.4	31	00	22	89.2	36	01	22	100.1	41	01	22
31.7	15	06	08	49.4	21	00	12	64.4	26	00	15	77.5	31	01	22	89.4	36	01	22	100.2	41	02	22
31.8	16	00	08	49.7	21	00	12	64.5	26	01	15	77.7	31	01	22	89.5	36	02	22	100.4	41	02	22
32.2	16	00	08	49.8	21	01	12	64.8	26	01	15	77.8	31	02	22	89.7	36	02	22	100.5	41	03	22
32.3	16	01	08	50.2	21	01	12	64.9	26	02	15	78.1	31	02	22	89.8	36	03	22	100.7	41	03	22
32.8	16	01	08	50.3	21	02	12	65.2	26	02	15	78.2	31	03	22	90.1	36	03	22	100.8	41	04	22
32.9	16	02	08	50.6	21	02	12	65.3	26	03	15	78.4	31	03	22	90.2	36	04	22	101.0	41	04	22
33.3	16	02	08	50.7	21	03	12	65.6	26	03	15	78.5	31	04	22	90.4	36	04	22	101.1	41	05	22
33.4	16	03	08	51.1	21	03	12	65.7	26	04	15	78.8	31	04	22	90.5	36	05	22	101.3	41	05	22
33.9	16	03	08	51.2	21	04	12	66.0	26	04	15	78.9	31	05	22	90.7	36	05	22	101.4	41	06	22
34.0	16	04	08	51.5	21	04	12	66.1	26	05	15	79.1	31	05	22	90.8	36	06	22	101.6	41	06	22
34.4	16	04	08	51.6	21	05	12	66.4	26	05	15	79.2	31	06	22	91.0	36	06	22	101.7	42	00	22
34.5	16	05	08	52.0	21	05	12	66.5	26	06	15	79.5	31	06	22	91.1	37	00	22	101.9	42	00	22
35.0	16	05	08	52.1	21	06	12	66.8	26	06	15	79.6	32	00	22	91.3	37	00	22	102.0	42	01	22
35.1	16	06	08	52.4	21	06	12	66.9	27	00	15	79.8	32	00	22	91.4	37	01	22				
35.5	16	06	08	52.5	22	00	12	67.2	27	00	15	79.9	32	01	22	91.6	37	01	22				
35.6	17	00	08	52.9	22	00	12	67.3	27	01	15	80.2	32	01	22	91.7	37	02	22				
36.0	17	00	08	53.0	22	01	12	67.5	27	01	15	80.3	32	02	22	91.9	37	02	22				
36.1	17	01	08	53.3	22	01	12	67.6	27	02	15	80.5	32	02	22	92.0	37	03	22				

Biparietal Diameter, Merz

Merz E. *Ultrasound in Gynecology and Obstetrics*. Stuttgart and New York: Thieme Medical Publishers, Inc., 1991, p. 326.
Standard Deviation derived from 5 and 95% Confidence Interval

BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD
21.0	12	01	13	35.0	16	00	15	49.0	20	00	16	63.0	24	04	17	77.0	29	03	18	91.0	35	01	19
22.0	12	03	12	36.0	16	02	15	50.0	20	03	15	64.0	24	06	17	78.0	29	06	18	92.0	35	04	19
23.0	12	05	12	37.0	16	04	13	51.0	20	05	16	65.0	25	01	17	79.0	30	01	18	93.0	35	06	19
24.0	13	00	13	38.0	16	06	15	52.0	21	00	16	66.0	25	04	17	80.0	30	04	18	94.0	36	03	21
25.0	13	01	13	39.0	17	01	15	53.0	21	02	16	67.0	25	06	17	81.0	30	06	19	95.0	36	06	21
26.0	13	04	12	40.0	17	03	15	54.0	21	04	17	68.0	26	01	18	82.0	31	02	19	96.0	37	02	21
27.0	13	06	13	41.0	17	05	16	55.0	21	06	17	69.0	26	04	17	83.0	31	05	18	97.0	37	06	19
28.0	14	01	13	42.0	18	00	16	56.0	22	01	17	70.0	26	06	17	84.0	32	01	18	98.0	38	02	21
29.0	14	02	13	43.0	18	02	16	57.0	22	04	16	71.0	27	01	18	85.0	32	04	18	99.0	38	06	19
30.0	14	04	13	44.0	18	04	16	58.0	22	06	16	72.0	27	04	18	86.0	32	06	19	100.0	39	02	22
31.0	14	06	15	45.0	18	06	16	59.0	23	01	17	73.0	27	06	18	87.0	33	02	19	101.0	39	06	21
32.0	15	01	15	46.0	19	01	16	60.0	23	04	17	74.0	28	02	18	88.0	33	06	19	102.0	40	02	22
33.0	15	03	13	47.0	19	03	15	61.0	23	06	17	75.0	28	04	18	89.0	34	01	21				
34.0	15	05	15	48.0	19	05	16	62.0	24	01	17	76.0	29	00	18	90.0	34	04	19				

Biparietal Diameter, Lasser

Lasser DM, Peisner DB, Vollebergh J, Timor-Tritsch I. "First-trimester fetal biometry using transvaginal sonography." *Ultrasound in Obstetrics and Gynecology* 3:104, 1993.

BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD
4.7	07	00	05	6.9	08	02	05	10.2	09	04	05	15.0	10	06	05	22.0	12	01	05	32.4	13	03	05
4.9	07	01	05	7.2	08	03	05	10.6	09	05	05	15.6	11	00	05	23.0	12	02	05	33.8	13	04	05
5.1	07	02	05	7.5	08	04	05	11.1	09	06	05	16.3	11	01	05	24.0	12	03	05	35.3	13	05	05
5.3	07	03	05	7.9	08	05	05	11.6	10	00	05	17.0	11	02	05	25.1	12	04	05	36.9	13	06	05
5.6	07	04	05	8.2	08	06	05	12.1	10	01	05	17.8	11	03	05	26.2	12	05	05	38.5	14	00	05
5.8	07	05	05	8.6	09	00	05	12.6	10	02	05	18.6	11	04	05	27.3	12	06	05				
6.1	07	06	05	8.9	09	01	05	13.2	10	03	05	19.4	11	05	05	28.5	13	00	05				
6.3	08	00	05	9.3	09	02	05	13.7	10	04	05	20.2	11	06	05	29.8	13	01	05				
6.6	08	01	05	9.7	09	03	05	14.3	10	05	05	21.1	12	00	05	31.1	13	02	05				

Biparietal Diameter, Rempen

Rempen A. "Biometrie in der Frühgravidität (I. Trimenon) (Biometry in Early Pregnancy (1st Trimester))." *Der Frauenarzt* 32:425, 1991.

BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD	BPD mm	wks	days	± 2SD
3.0	06	06	10	8.0	08	02	10	13.0	09	05	10	18.0	11	01	10	23.0	12	04	10				
4.0	07	01	10	9.0	08	04	10	14.0	10	00	10	19.0	11	03	10	24.0	12	06	10				
5.0	07	03	10	10.0	08	06	10	15.0	10	02	10	20.0	11	05	10	25.0	13	01	10				
6.0	07	05	10	11.0	09	01	10	16.0	10	04	10	21.0	12	00	10	26.0	13	03	10				
7.0	08	00	10	12.0	09	03	10	17.0	10	06	10	22.0	12	02	10	27.0	13	05	10				

Biparietal Diameter, Tokyo

Masuda H, Shinozuka N, Okai T, Mizuno M. "Diagnosis of the Week of Pregnancy and Prognosis." *Perinatal Care* 8:719-726.

BPD mm	mean days	± days	BPD mm	mean days	± days	BPD mm	mean days	± days	BPD mm	mean days	± days	BPD mm	mean days	± days	BPD mm	mean days	± days
20.0	85	7	33.0	112	7	46.0	139	14	59.0	169	14	72.0	201	21	85.0	241	21
21.0	87	7	34.0	114	7	47.0	141	14	60.0	171	14	73.0	204	21	86.0	245	21
22.0	89	7	35.0	116	7	48.0	144	14	61.0	173	14	74.0	207	21	87.0	249	21
23.0	91	7	36.0	118	7	49.0	146	14	62.0	176	14	75.0	209	21	88.0	253	21
24.0	93	7	37.0	120	7	50.0	148	14	63.0	178	14	76.0	212	21	89.0	257	21
25.0	95	7	38.0	122	7	51.0	150	14	64.0	181	14	77.0	215	21	90.0	262	28
26.0	97	7	39.0	124	7	52.0	152	14	65.0	183	14	78.0	218	21	91.0	267	28
27.0	99	7	40.0	126	14	53.0	155	14	66.0	186	14	79.0	221	21	92.0	273	28
28.0	101	7	41.0	128	14	54.0	157	14	67.0	188	14	80.0	224	21	93.0	279	28
29.0	103	7	42.0	131	14	55.0	159	14	68.0	191	14	81.0	227	21	94.0	287	28
30.0	105	7	43.0	133	14	56.0	162	14	69.0	193	14	82.0	231	21			
31.0	107	7	44.0	135	14	57.0	164	14	70.0	196	21	83.0	234	21			
32.0	110	7	45.0	137	14	58.0	166	14	71.0	198	21	84.0	237	21			

Biparietal Diameter, Osaka

Aoki M, Yamada M. "Examining Fetal Growth." *Obstetrics and Gynecology* 47:547-556, 1983.

BPD mm	mean days	± days	BPD mm	mean days	± days	BPD mm	mean days	± days	BPD mm	mean days	± days	BPD mm	mean days	± days	BPD mm	mean days	± days
14.0	71	7	28.0	98	7	42.0	126	7	56.0	157	14	70.0	190	14	84.0	230	—
15.0	73	7	29.0	99	7	43.0	128	7	57.0	159	14	71.0	193	—	85.0	234	—
16.0	75	7	30.0	101	7	44.0	130	7	58.0	161	14	72.0	195	—	86.0	237	—
17.0	77	7	31.0	103	7	45.0	132	7	59.0	163	14	73.0	198	—	87.0	241	—
18.0	79	7	32.0	105	7	46.0	135	7	60.0	166	14	74.0	200	—	88.0	245	—
19.0	80	7	33.0	107	7	47.0	137	7	61.0	168	14	75.0	203	—	89.0	249	—
20.0	82	7	34.0	109	7	48.0	139	7	62.0	171	14	76.0	206	—	90.0	254	—
21.0	84	7	35.0	112	7	49.0	141	7	63.0	173	14	77.0	209	—	91.0	259	—
22.0	86	7	36.0	114	7	50.0	143	14	64.0	175	14	78.0	212	—	92.0	265	—
23.0	88	7	37.0	116	7	51.0	145	14	65.0	178	14	79.0	214	—	93.0	273	—
24.0	90	7	38.0	118	7	52.0	148	14	66.0	180	14	80.0	217	—			
25.0	92	7	39.0	120	7	53.0	150	14	67.0	183	14	81.0	220	—			
26.0	94	7	40.0	122	7	54.0	152	14	68.0	185	14	82.0	224	—			
27.0	96	7	41.0	124	7	55.0	154	14	69.0	187	14	83.0	227	—			

Biparietal Diameter, JSUM

Japan Society of Ultrasonics in Medicine. "Standardization of Fetometry and Official Announcement of Diagnostic Guidelines." *J. Med. Ultrasonics* 28:844-872, 2001.

BPD mm	- 1SD	days	+ 1SD	BPD mm	- 1SD	days	+ 1SD	BPD mm	- 1SD	days	+ 1SD	BPD mm	- 1SD	days	+ 1SD	BPD mm	- 1SD	days	+ 1SD	BPD mm	- 1SD	days	+ 1SD
13.0	4	71	4	26.0	5	98	5	39.0	6	125	6	52.0	7	153	7	65.0	9	183	9	78.0	12	219	12
14.0	4	73	4	27.0	5	100	5	40.0	6	127	6	53.0	8	155	8	66.0	10	185	10	79.0	12	222	12
15.0	4	75	4	28.0	5	102	5	41.0	6	129	6	54.0	8	157	8	67.0	10	188	10	80.0	12	225	12
16.0	4	77	4	29.0	5	104	5	42.0	6	131	6	55.0	8	159	8	68.0	10	191	10	81.0	12	229	12
17.0	4	79	4	30.0	5	106	5	43.0	6	133	6	56.0	8	162	8	69.0	10	193	10	82.0	13	232	13
18.0	4	81	4	31.0	5	108	5	44.0	6	135	6	57.0	8	164	8	70.0	10	196	10	83.0	13	236	13
19.0	4	83	4	32.0	5	110	5	45.0	6	137	6	58.0	8	166	8	71.0	10	199	10	84.0	13	240	13
20.0	4	85	4	33.0	5	112	5	46.0	7	140	7	59.0	8	169	8	72.0	11	201	11	85.0	13	244	13
21.0	4	87	4	34.0	5	114	5	47.0	7	142	7	60.0	9	171	9	73.0	11	204	11	86.0	14	248	14
22.0	4	90	4	35.0	5	116	5	48.0	7	144	7	61.0	9	173	9	74.0	11	207	11	87.0	14	252	14
23.0	5	92	5	36.0	6	118	6	49.0	7	146	7	62.0	9	176	9	75.0	11	210	11	88.0	14	257	14
24.0	5	94	5	37.0	6	120	6	50.0	7	148	7	63.0	9	178	9	76.0	11	213	11	89.0	14	263	14
25.0	5	96	5	38.0	6	123	6	51.0	7	150	7	64.0	9	180	9	77.0	12	216	12	90.0	15	269	15

Biparietal Diameter, ASUM

Westerway SC. "Ultrasonic Fetal Measurements: New Australian Standards for the New Millennium." *Aust NZ J Obstet Gynaecol* 40:3:297-302, 2000.

BPD mm	days	BPD mm	days	BPD mm	days	BPD mm	days	BPD mm	days	BPD mm	days
14.0	77	29.0	100	44.0	130	59.0	165	74.0	205	89.0	251
15.0	78	30.0	102	45.0	132	60.0	167	75.0	208	90.0	255
16.0	80	31.0	104	46.0	134	61.0	170	76.0	211	91.0	258
17.0	81	32.0	106	47.0	136	62.0	172	77.0	214	92.0	261
18.0	83	33.0	108	48.0	138	63.0	175	78.0	217	93.0	265
19.0	84	34.0	110	49.0	141	64.0	177	79.0	220	94.0	268
20.0	86	35.0	111	50.0	143	65.0	180	80.0	223	95.0	271
21.0	87	36.0	113	51.0	145	66.0	183	81.0	226	96.0	275
22.0	89	37.0	115	52.0	148	67.0	186	82.0	229	97.0	278
23.0	90	38.0	117	53.0	150	68.0	188	83.0	232	98.0	282
24.0	92	39.0	119	54.0	152	69.0	191	84.0	235	99.0	285
25.0	94	40.0	121	55.0	155	70.0	194	85.0	238	99.5	287
26.0	95	41.0	123	56.0	157	71.0	197	86.0	242		
27.0	97	42.0	125	57.0	160	72.0	199	87.0	245		
28.0	99	43.0	128	58.0	162	73.0	202	88.0	248		

Occipital Frontal Diameter, Merz

Merz E, Wellek S. "Normal Fetal Growth Profile – A Uniform Model for Calculating Normal Current Head and Abdomen Parameters and Long Limb Bones." *Ultraschall in der Medizin* 17(4):153-162, 1996.

Range: 13 – 40 weeks, 31.8 – 114.4 mm

Occipital Frontal Diameter, ASUM

Westerway SC. "Ultrasonic Fetal Measurements: New Australian Standards for the New Millennium." *Aust NZ J Obstet Gynaecol* 40:3:297-302, 2000.

OFD mm	days	OFD mm	days	OFD mm	days	OFD mm	days	OFD mm	days	OFD mm	days
13.0	77	32.0	94	51.0	118	70.0	150	89.0	190	108.0	237
14.0	78	33.0	95	52.0	120	71.0	152	90.0	192	109.0	240
15.0	79	34.0	96	53.0	121	72.0	154	91.0	194	110.0	242
16.0	80	35.0	97	54.0	123	73.0	156	92.0	197	111.0	245
17.0	80	36.0	99	55.0	125	74.0	158	93.0	199	112.0	248
18.0	81	37.0	100	56.0	126	75.0	160	94.0	201	113.0	251
19.0	82	38.0	101	57.0	128	76.0	162	95.0	204	114.0	253
20.0	83	39.0	102	58.0	129	77.0	164	96.0	206	115.0	256
21.0	84	40.0	103	59.0	131	78.0	166	97.0	209	116.0	259
22.0	84	41.0	105	60.0	133	79.0	168	98.0	211	117.0	262
23.0	85	42.0	106	61.0	134	80.0	170	99.0	214	118.0	265
24.0	86	43.0	107	62.0	136	81.0	172	100.0	216	119.0	268
25.0	87	44.0	109	63.0	138	82.0	174	101.0	219	120.0	271
26.0	88	45.0	110	64.0	139	83.0	177	102.0	221	121.0	273
27.0	89	46.0	111	65.0	141	84.0	179	103.0	224	122.0	276
28.0	90	47.0	113	66.0	143	85.0	181	104.0	226	123.0	279
29.0	91	48.0	114	67.0	145	86.0	183	105.0	229	124.0	282
30.0	92	49.0	116	68.0	147	87.0	185	106.0	232	125.0	285
31.0	93	50.0	117	69.0	148	88.0	188	107.0	234	125.5	287

Abdominal Transverse Diameter, Merz

Merz E, Wellek S. "Normal Fetal Growth Profile – A Uniform Model for Calculating Normal Current Head and Abdomen Parameters and Long Limb Bones." *Ultraschall in der Medizin* 17(4):153-162, 1996.

Range: 12 – 40 weeks, 18.7 – 107.1 mm

Abdominal Sagittal Diameter, Merz

Merz E, Wellek S. "Normal Fetal Growth Profile – A Uniform Model for Calculating Normal Current Head and Abdomen Parameters and Long Limb Bones." *Ultraschall in der Medizin* 17(4):153-162, 1996.

Range: 12 – 40 weeks, 17.4 – 105.6 mm

Fractional Shortening, Cyr

Cyr DR, Guntheroth WG, Mack LA. "Fetal Echocardiography." In: Berman MC (ed.) *Diagnostic Medical Sonography*, Vol I: Obstetrics and Gynecology, 249-271, 1991.

FS%=(LVIDd - LVIDs)/LVIDd*100

Fetal Weight Estimation, Osaka

Aoki M, Yamada M. "Examining Fetal Growth." *Obstetrics and Gynecology* 47:547-556, 1983.

EFW grams	days	EFW grams	days	EFW grams	days	EFW grams	days	EFW grams	days	EFW grams	days
365.0	140	707.0	165	1,166.0	190	1,716.0	215	2,314.0	240	2,918.0	265
376.0	141	723.0	166	1,187.0	191	1,739.0	216	2,338.0	241	2,942.0	266
388.0	142	740.0	167	1,208.0	192	1,762.0	217	2,363.0	242	2,966.0	267
399.0	143	756.0	168	1,228.0	193	1,786.0	218	2,387.0	243	2,989.0	268
411.0	144	773.0	169	1,249.0	194	1,809.0	219	2,411.0	244	3,013.0	269
423.0	145	790.0	170	1,270.0	195	1,833.0	220	2,436.0	245	3,036.0	270
435.0	146	807.0	171	1,292.0	196	1,857.0	221	2,460.0	246	3,060.0	271
448.0	147	825.0	172	1,313.0	197	1,880.0	222	2,484.0	247	3,083.0	272
461.0	148	842.0	173	1,334.0	198	1,904.0	223	2,509.0	248	3,106.0	273
474.0	149	860.0	174	1,356.0	199	1,928.0	224	2,533.0	249	3,130.0	274
487.0	150	878.0	175	1,378.0	200	1,952.0	225	2,557.0	250	3,153.0	275
500.0	151	896.0	176	1,399.0	201	1,976.0	226	2,582.0	251	3,176.0	276
513.0	152	914.0	177	1,421.0	202	2,000.0	227	2,606.0	252	3,199.0	277
527.0	153	933.0	178	1,443.0	203	2,024.0	228	2,630.0	253	3,222.0	278
541.0	154	951.0	179	1,465.0	204	2,048.0	229	2,654.0	254	3,245.0	279
555.0	155	970.0	180	1,488.0	205	2,072.0	230	2,678.0	255	3,268.0	280
569.0	156	989.0	181	1,510.0	206	2,096.0	231	2,702.0	256	3,291.0	281
584.0	157	1,008.0	182	1,533.0	207	2,120.0	232	2,727.0	257	3,314.0	282
599.0	158	1,027.0	183	1,555.0	208	2,144.0	233	2,751.0	258	3,336.0	283
613.0	159	1,047.0	184	1,578.0	209	2,168.0	234	2,775.0	259	3,359.0	284
628.0	160	1,066.0	185	1,601.0	210	2,193.0	235	2,799.0	260	3,381.0	285
644.0	161	1,086.0	186	1,623.0	211	2,217.0	236	2,823.0	261	3,404.0	286
659.0	162	1,106.0	187	1,646.0	212	2,241.0	237	2,847.0	262	3,426.0	287
675.0	163	1,126.0	188	1,669.0	213	2,265.0	238	2,870.0	263		
691.0	164	1,146.0	189	1,693.0	214	2,290.0	239	2,894.0	264		

Fetal Weight Estimation, JSUM

Japan Society of Ultrasonics in Medicine. "Standardization of Fetometry and Official Announcement of Diagnostic Guidelines." *J. Med. Ultrasonics* 28:844-872, 2001.

EFW grams	days	EFW grams	days	EFW grams	days	EFW grams	days	EFW grams	days	EFW grams	days
187.0	126	469.0	154	892.0	182	1,470.0	210	2,156.0	238	2,838.0	266
196.0	127	482.0	155	911.0	183	1,494.0	211	2,181.0	239	2,860.0	267
204.0	128	495.0	156	929.0	184	1,517.0	212	2,207.0	240	2,881.0	268
213.0	129	508.0	157	948.0	185	1,541.0	213	2,232.0	241	2,903.0	269
221.0	130	521.0	158	967.0	186	1,564.0	214	2,257.0	242	2,924.0	270
230.0	131	534.0	159	986.0	187	1,588.0	215	2,282.0	243	2,946.0	271
238.0	132	547.0	160	1,004.0	188	1,611.0	216	2,308.0	244	2,967.0	272
247.0	133	560.0	161	1,023.0	189	1,635.0	217	2,333.0	245	2,989.0	273
256.0	134	574.0	162	1,043.0	190	1,659.0	218	2,358.0	246	3,008.0	274
266.0	135	589.0	163	1,063.0	191	1,684.0	219	2,383.0	247	3,028.0	275
275.0	136	603.0	164	1,083.0	192	1,708.0	220	2,408.0	248	3,047.0	276
285.0	137	617.0	165	1,103.0	193	1,732.0	221	2,432.0	249	3,067.0	277
294.0	138	631.0	166	1,123.0	194	1,756.0	222	2,457.0	250	3,086.0	278
304.0	139	646.0	167	1,143.0	195	1,781.0	223	2,482.0	251	3,106.0	279
313.0	140	660.0	168	1,163.0	196	1,805.0	224	2,507.0	252	3,125.0	280
324.0	141	676.0	169	1,184.0	197	1,830.0	225	2,531.0	253	3,142.0	281
334.0	142	692.0	170	1,206.0	198	1,855.0	226	2,555.0	254	3,159.0	282
345.0	143	708.0	171	1,227.0	199	1,880.0	227	2,579.0	255	3,176.0	283
355.0	144	723.0	172	1,249.0	200	1,905.0	228	2,604.0	256	3,193.0	284
366.0	145	739.0	173	1,270.0	201	1,930.0	229	2,628.0	257	3,210.0	285
376.0	146	755.0	174	1,292.0	202	1,955.0	230	2,652.0	258	3,227.0	286
387.0	147	771.0	175	1,313.0	203	1,980.0	231	2,676.0	259	3,244.0	287
399.0	148	788.0	176	1,335.0	204	2,005.0	232	2,699.0	260		
410.0	149	806.0	177	1,358.0	205	2,030.0	233	2,722.0	261		
422.0	150	823.0	178	1,380.0	206	2,055.0	234	2,745.0	262		
434.0	151	840.0	179	1,403.0	207	2,081.0	235	2,769.0	263		
446.0	152	857.0	180	1,425.0	208	2,106.0	236	2,792.0	264		
457.0	153	875.0	181	1,448.0	209	2,131.0	237	2,815.0	265		

Fetal Weight Estimation, Tokyo

Masuda H, Shinozuka N, Okai T, Mizuno M. "Diagnosis of the Week of Pregnancy and Prognosis." *Perinatal Care* 8:719-726.

EFW grams	days	EFW grams	days	EFW grams	days	EFW grams	days	EFW grams	days	EFW grams	days
216.0	140	579.0	165	991.0	190	1,553.0	215	2,251.0	240	2,928.0	265
232.0	141	594.0	166	1,010.0	191	1,579.0	216	2,280.0	241	2,950.0	266
247.0	142	608.0	167	1,030.0	192	1,605.0	217	2,309.0	242	2,972.0	267
263.0	143	623.0	168	1,050.0	193	1,631.0	218	2,339.0	243	2,993.0	268
278.0	144	638.0	169	1,070.0	194	1,658.0	219	2,367.0	244	3,014.0	269
293.0	145	653.0	170	1,090.0	195	1,684.0	220	2,396.0	245	3,034.0	270
307.0	146	668.0	171	1,111.0	196	1,711.0	221	2,425.0	246	3,053.0	271
322.0	147	684.0	172	1,131.0	197	1,738.0	222	2,454.0	247	3,072.0	272
337.0	148	699.0	173	1,153.0	198	1,766.0	223	2,482.0	248	3,090.0	273
351.0	149	715.0	174	1,174.0	199	1,793.0	224	2,511.0	249	3,107.0	274
366.0	150	730.0	175	1,196.0	200	1,821.0	225	2,539.0	250	3,123.0	275
380.0	151	746.0	176	1,218.0	201	1,849.0	226	2,567.0	251	3,138.0	276
394.0	152	762.0	177	1,240.0	202	1,877.0	227	2,595.0	252	3,153.0	277
409.0	153	779.0	178	1,262.0	203	1,905.0	228	2,623.0	253	3,166.0	278
423.0	154	795.0	179	1,285.0	204	1,934.0	229	2,650.0	254	3,179.0	279
437.0	155	812.0	180	1,308.0	205	1,962.0	230	2,677.0	255	3,190.0	280
451.0	156	829.0	181	1,331.0	206	1,991.0	231	2,704.0	256	3,201.0	281
465.0	157	846.0	182	1,355.0	207	2,019.0	232	2,730.0	257	3,210.0	282
479.0	158	863.0	183	1,379.0	208	2,048.0	233	2,756.0	258	3,219.0	283
493.0	159	881.0	184	1,403.0	209	2,077.0	234	2,782.0	259	3,226.0	284
508.0	160	899.0	185	1,427.0	210	2,106.0	235	2,807.0	260	3,232.0	285
522.0	161	917.0	186	1,452.0	211	2,135.0	236	2,832.0	261	3,237.0	286
536.0	162	935.0	187	1,477.0	212	2,164.0	237	2,857.0	262	3,240.0	287
550.0	163	953.0	188	1,502.0	213	2,193.0	238	2,881.0	263		
565.0	164	972.0	189	1,527.0	214	2,222.0	239	2,905.0	264		

Head Circumference, Hadlock

Hadlock FP, Deter RL, Harrist RB, Park SK. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters." *Radiology* 152:497, 1984.

MA = 8.96 + 0.540 *(HC) + 0.0003 *(HC3)

±2 Standard Deviations						
	12-18 wk	± 1.19 wk (8 days)		30-36 wk	± 2.98 wk (21 days)
	18-24 wk	± 1.48 wk (10 days)		36-42 wk	± 2.70 wk (19 days)
	24-30 wk	± 2.06 wk (14 days)			

HC mm	wks	days	± 2SD
56.0	12	00	08
56.6	12	00	08
56.7	12	01	08
59.1	12	01	08
59.2	12	02	08
61.6	12	02	08
61.7	12	03	08
64.0	12	03	08
64.1	12	04	08
66.5	12	04	08
66.6	12	05	08
69.0	12	05	08
69.1	12	06	08
71.4	12	06	08
71.5	13	00	08
73.8	13	00	08
73.9	13	01	08
76.3	13	01	08
76.4	13	02	08
78.7	13	02	08
78.8	13	03	08
81.1	13	03	08
81.2	13	04	08
83.4	13	04	08
83.5	13	05	08
85.8	13	05	08
85.9	13	06	08
88.1	13	06	08
88.2	14	00	08
90.5	14	00	08
90.6	14	01	08
92.8	14	01	08
92.9	14	02	08
95.1	14	02	08
95.2	14	03	08
97.4	14	03	08
97.5	14	04	08
99.7	14	04	08
99.8	14	05	08
101.9	14	05	08
102.0	14	06	08
104.2	14	06	08
104.3	15	00	08
106.4	15	00	08
106.5	15	01	08
108.6	15	01	08
108.7	15	02	08
110.8	15	02	08
110.9	15	03	08
113.0	15	03	08
113.1	15	04	08
115.2	15	04	08
115.3	15	05	08
117.4	15	05	08
117.5	15	06	08
119.5	15	06	08
119.6	16	00	08
121.6	16	00	08
121.7	16	01	08
123.7	16	01	08
123.8	16	02	08
125.8	16	02	08
125.9	16	03	08
127.9	16	03	08
128.0	16	04	08
130.0	16	04	08
130.1	16	05	08
132.1	16	05	08
132.2	16	06	08
134.1	16	06	08
134.2	17	00	08

HC mm	wks	days	± 2SD
136.1	17	00	08
136.2	17	01	08
138.1	17	01	08
138.2	17	02	08
140.1	17	02	08
140.2	17	03	08
142.1	17	03	08
142.2	17	04	08
144.1	17	04	08
144.2	17	05	08
146.1	17	05	08
146.2	17	06	08
148.0	17	06	08
148.1	18	00	10
149.9	18	00	10
150.0	18	01	10
151.9	18	01	10
152.0	18	02	10
153.8	18	02	10
153.9	18	03	10
155.6	18	03	10
155.7	18	04	10
157.5	18	04	10
157.6	18	05	10
159.4	18	05	10
159.5	18	06	10
161.2	18	06	10
161.3	19	00	10
163.1	19	00	10
163.2	19	01	10
164.9	19	01	10
165.0	19	02	10
166.7	19	02	10
166.8	19	03	10
168.5	19	03	10
168.6	19	04	10
170.3	19	04	10
170.4	19	05	10
172.1	19	05	10
172.2	19	06	10
173.9	19	06	10
174.0	20	00	10
175.6	20	00	10
175.7	20	01	10
177.3	20	01	10
177.4	20	02	10
179.1	20	02	10
179.2	20	03	10
180.8	20	03	10
180.9	20	04	10
182.5	20	04	10
182.6	20	05	10
184.2	20	05	10
184.3	20	06	10
185.9	20	06	10
186.0	21	00	10
187.6	21	00	10
187.7	21	01	10
189.2	21	01	10
189.3	21	02	10
190.9	21	02	10
191.0	21	03	10
192.5	21	03	10
192.6	21	04	10
194.1	21	04	10
194.2	21	05	10
195.8	21	05	10
195.9	21	06	10
197.4	21	06	10
197.5	22	00	10
199.0	22	00	10

HC mm	wks	days	± 2SD
199.1	22	01	10
200.6	22	01	10
200.7	22	02	10
202.1	22	02	10
202.2	22	03	10
203.7	22	03	10
203.8	22	04	10
205.3	22	04	10
205.4	22	05	10
206.8	22	05	10
206.9	22	06	10
208.3	22	06	10
208.4	23	00	10
209.9	23	00	10
210.0	23	01	10
211.4	23	01	10
211.5	23	02	10
212.9	23	02	10
213.0	23	03	10
214.4	23	03	10
214.5	23	04	10
215.9	23	04	10
216.0	23	05	10
217.4	23	05	10
217.5	23	06	10
218.9	23	06	10
219.0	24	00	14
220.3	24	00	14
220.4	24	01	14
221.8	24	01	14
221.9	24	02	14
223.2	24	02	14
223.3	24	03	14
224.7	24	03	14
224.8	24	04	14
226.1	24	04	14
226.2	24	05	14
227.5	24	05	14
227.6	24	06	14
228.9	24	06	14
229.0	25	00	14
230.4	25	00	14
230.5	25	01	14
231.8	25	01	14
231.9	25	02	14
233.1	25	02	14
233.2	25	03	14
234.5	25	03	14
234.6	25	04	14
235.9	25	04	14
236.0	25	05	14
237.3	25	05	14
237.4	25	06	14
238.6	25	06	14
238.7	26	00	14
240.0	26	00	14
240.1	26	01	14
241.3	26	01	14
241.4	26	02	14
242.7	26	02	14
242.8	26	03	14
244.0	26	03	14
244.1	26	04	14
245.3	26	04	14
245.4	26	05	14
246.6	26	05	14
246.7	26	06	14
248.0	26	06	14
248.1	27	00	14
249.3	27	00	14
249.4	27	01	14

HC mm	wks	days	± 2SD
250.6	27	01	14
250.7	27	02	14
251.8	27	02	14
251.9	27	03	14
253.1	27	03	14
253.2	27	04	14
254.4	27	04	14
254.5	27	05	14
255.7	27	05	14
255.8	27	06	14
256.9	27	06	14
257.0	28	00	14
258.2	28	00	14
258.3	28	01	14
259.4	28	01	14
259.5	28	02	14
260.7	28	02	14
260.8	28	03	14
261.9	28	03	14
262.0	28	04	14
263.2	28	04	14
263.3	28	05	14
264.4	28	05	14
264.5	28	06	14
265.6	28	06	14
265.7	29	00	14
266.8	29	00	14
266.9	29	01	14
268.0	29	01	14
268.1	29	02	14
269.2	29	02	14
269.3	29	03	14
270.4	29	03	14
270.5	29	04	14
271.6	29	04	14
271.7	29	05	14
272.8	29	05	14
272.9	29	06	14
274.0	29	06	14
274.1	30	00	21
275.1	30	00	21
275.2	30	01	21
276.3	30	01	21
276.4	30	02	21
277.5	30	02	21
277.6	30	03	21
278.6	30	03	21
278.7	30	04	21
279.8	30	04	21
279.9	30	05	21
280.9	30	05	21
281.0	30	06	21
282.1	30	06	21
282.2	31	00	21
283.2	31	00	21
283.3	31	01	21
284.3	31	01	21
284.4	31	02	21
285.4	31	02	21
285.5	31	03	21
286.6	31	03	21
286.7	31	04	21
287.7	31	04	21
287.8	31	05	21
288.8	31	05	21
288.9	31	06	21
289.9	31	06	21
290.0	32	00	21
291.0	32	00	21
291.1	32	01	21
292.1	32	01	21

HC mm	wks	days	± 2SD
292.2	32	02	21
293.2	32	02	21
293.3	32	03	21
294.3	32	03	21
294.4	32	04	21
295.3	32	04	21
295.4	32	05	21
296.4	32	05	21
296.5	32	06	21
297.5	32	06	21
297.6	33	00	21
298.5	33	00	21
298.6	33	01	21
299.6	33	01	21
299.7	33	02	21
300.7	33	02	21
300.8	33	03	21
301.7	33	03	21
301.8	33	04	21
302.8	33	04	21
302.9	33	05	21
303.8	33	05	21
303.9	33	06	21
304.9	33	06	21
305.0	34	00	21
305.9	34	00	21
306.0	34	01	21
306.9	34	01	21
307.0	34	02	21
307.9	34	02	21
308.0	34	03	21
309.0	34	03	21
309.1	34	04	21
310.0	34	04	21
310.1	34	05	21
311.0	34	05	21
311.1	34	06	21
312.0	34	06	21
312.1	35	00	21
313.0	35	00	21
313.1	35	01	21
314.0	35	01	21
314.1	35	02	21
315.0	35	02	21
315.1	35	03	21
316.0	35	03	21
316.1	35	04	21
317.0	35	04	21
317.1	35	05	21
318.0	35	05	21
318.1	35	06	21
319.0	35	06	21
319.1	36	00	19
320.0	36	00	19
320.1	36	01	19
320.9	36	01	19
321.0	36	02	19
321.9	36	02	19
322.0	36	03	19
322.9	36	03	19
323.0	36	04	19
323.8	36	04	19
323.9	36	05	19
324.8	36	05	19
324.9	36	06	19
325.8	36	06	19
325.9	37	00	19
326.7	37	00	19
326.8	37	01	19
327.7	37	01	19
327.8	37	02	19

HC mm	wks	days	± 2SD
328.6	37	02	19
328.7	37	03	19
329.5	37	03	19
329.6	37	04	19
330.5	37	04	19
330.6	37	05	19
331.4	37	05	19
331.5	37	06	19
332.4	37	06	19
332.5	38	00	19
333.3	38	00	19
333.4	38	01	19
334.2	38	01	19
334.3	38	02	19
335.1	38	02	19
335.2	38	03	19
336.1	38	03	19
336.2	38	04	19
337.0	38	04	19
337.1	38	05	19
337.9	38	05	19
338.0	38	06	19
338.8	38	06	19
338.9	39	00	19
339.7	39	00	19
339.8	39	01	19
340.6	39	01	19
340.7	39	02	19
341.5	39	02	19
341.6	39	03	19
342.4	39	03	19
342.5	39	04	19
343.3	39	04	19
343.4	39	05	19
344.2	39	05	19
344.3	39	06	19
345.1	39	06	19
345.2	40	00	19
346.0	40	00	19
346.1	40	01	19
346.8	40	01	19
346.9	40	02	19
347.7	40	02	19
347.8	40	03	19
348.6	40	03	19
348.7	40	04	19
349.5	40	04	19
349.6	40	05	19
350.3	40	05	19
350.4	40	06	19
351.2	40	06	19
351.3	41	00	19
352.1	41	00	19
352.2	41	01	19
352.9	41	01	19
353.0	41	02	19
353.8	41	02	19
353.9	41	03	19
354.6	41	03	19
354.7	41	04	19
355.5	41	04	19
355.6	41	05	19
356.3	41	05	19
356.4	41	06	19
357.2	41	06	19
357.3	42	00	19
358.0	42	00	19

Head Circumference, Merz

Merz E. *Ultrasound in Gynecology and Obstetrics*. Stuttgart and New York: Thieme Medical Publishers, Inc., 1991, p. 326.

HC mm	wks	days	± 2SD	HC mm	wks	days	± 2SD	HC mm	wks	days	± 2SD	HC mm	wks	days	± 2SD	HC mm	wks	days	± 2SD	HC mm	wks	days	± 2SD
72.0	12	01	09	122.0	15	04	12	172.0	19	02	13	222.0	23	04	15	272.0	28	02	16	322.0	34	01	17
74.0	12	02	11	124.0	15	05	12	174.0	19	03	12	224.0	23	04	15	274.0	28	04	16	324.0	34	03	18
76.0	12	03	10	126.0	15	06	11	176.0	19	04	13	226.0	23	06	15	276.0	28	05	16	326.0	34	05	18
78.0	12	04	10	128.0	16	00	12	178.0	19	06	13	228.0	24	00	16	278.0	28	06	17	328.0	34	06	18
80.0	12	05	10	130.0	16	01	12	180.0	19	06	15	230.0	24	01	16	280.0	29	01	16	330.0	35	01	18
82.0	12	06	10	132.0	16	02	12	182.0	20	01	13	232.0	24	03	15	282.0	29	02	16	332.0	35	04	18
84.0	12	06	11	134.0	16	03	12	184.0	20	01	15	234.0	24	04	15	284.0	29	04	17	334.0	35	06	18
86.0	13	01	10	136.0	16	04	12	186.0	20	03	13	236.0	24	05	16	286.0	29	06	16	336.0	36	01	18
88.0	13	01	11	138.0	16	05	12	188.0	20	04	13	238.0	24	06	16	288.0	30	00	16	338.0	36	03	18
90.0	13	02	11	140.0	16	06	12	190.0	20	05	13	240.0	25	01	15	290.0	30	01	17	340.0	36	04	19
92.0	13	04	10	142.0	17	00	12	192.0	20	06	15	242.0	25	02	16	292.0	30	04	16	342.0	36	06	19
94.0	13	04	11	144.0	17	01	12	194.0	21	01	13	244.0	25	04	15	294.0	30	05	16	344.0	37	01	19
96.0	13	05	10	146.0	17	02	12	196.0	21	01	15	246.0	25	05	16	296.0	30	06	17	346.0	37	04	18
98.0	13	06	11	148.0	17	04	12	198.0	21	03	13	248.0	25	06	16	298.0	31	01	16	348.0	37	06	19
100.0	14	00	10	150.0	17	04	13	200.0	21	04	15	250.0	26	00	16	300.0	31	03	17	350.0	38	01	21
102.0	14	01	12	152.0	17	06	12	202.0	21	05	15	252.0	26	01	16	302.0	31	04	17	352.0	38	04	19
104.0	14	02	11	154.0	17	06	13	204.0	21	06	15	254.0	26	03	15	304.0	31	06	17	354.0	38	06	19
106.0	14	03	11	156.0	18	01	12	206.0	22	01	15	256.0	26	04	16	306.0	32	01	17	356.0	39	01	19
108.0	14	04	11	158.0	18	01	13	208.0	22	01	15	258.0	26	06	15	308.0	32	02	17	358.0	39	04	19
110.0	14	05	11	160.0	18	03	12	210.0	22	03	15	260.0	27	00	16	310.0	32	04	17	360.0	39	06	19
112.0	14	06	11	162.0	18	04	12	212.0	22	04	15	262.0	27	01	16	312.0	32	06	17	362.0	40	01	19
114.0	15	00	11	164.0	18	05	12	214.0	22	05	15	264.0	27	03	15	314.0	33	01	17	364.0	40	04	19
116.0	15	01	11	166.0	18	06	12	216.0	22	06	15	266.0	27	04	16	316.0	33	03	17				
118.0	15	02	11	168.0	19	00	13	218.0	23	01	15	268.0	27	06	15	318.0	33	04	17				
120.0	15	03	11	170.0	19	01	12	220.0	23	02	13	270.0	28	01	16	320.0	33	06	18				

Head Circumference, Lasser

Lasser DM, Peisner DB, Vollebergh J, Timor-Tritsch I. "First-trimester fetal biometry using transvaginal sonography." *Ultrasound in Obstetrics and Gynecology* 3:104, 1993.

HC mm	wks	days	± 2SD	HC mm	wks	days	± 2SD	HC mm	wks	days	± 2SD	HC mm	wks	days	± 2SD	HC mm	wks	days	± 2SD	HC mm	wks	days	± 2SD
35.3	08	05	05	45.6	09	05	05	56.0	10	05	05	64.9	11	04	05	75.2	12	04	05	85.6	13	04	05
36.8	08	06	05	47.1	09	06	05	57.5	10	06	05	66.4	11	05	05	76.7	12	05	05	87.1	13	05	05
38.2	09	00	05	48.6	10	00	05	59.0	11	00	05	67.8	11	06	05	78.2	12	06	05	88.6	13	06	05
39.7	09	01	05	50.0	10	01	05	60.4	11	01	05	69.3	12	00	05	79.7	13	00	05	90.0	14	00	05
41.2	09	02	05	51.6	10	02	05	61.9	11	02	05	70.8	12	01	05	81.2	13	01	05	91.5	14	01	05
42.7	09	03	05	53.0	10	03	05	63.4	11	03	05	72.3	12	02	05	82.6	13	02	05	93.0	14	02	05
44.2	09	04	05	54.5	10	04	05	64.0	11	03	05	73.8	12	03	05	84.1	13	03	05				

Abdominal Circumference, Hadlock

Hadlock FP, Deter RL, Harrist RB, Park SK. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters." *Radiology* 152:497, 1984.

MA = 8.14 + 0.753 * AC + 0.0036 *(AC^2)

±2 Standard Deviations			
12-18 wk	± 1.66 wk	(12 days)	
18-24 wk	± 2.06 wk	(14 days)	
24-30 wk	± 2.18 wk	(15 days)	
30-36 wk	± 2.96 wk	(21 days)	
36-42 wk	± 3.04 wk	(21 days)	

AC mm	wks	days	± 2SD
50.0	12	00	12
50.9	12	00	12
51.0	12	01	12
52.7	12	01	12
52.8	12	02	12
54.5	12	02	12
54.6	12	03	12
56.3	12	03	12
56.4	12	04	12
58.1	12	04	12
58.2	12	05	12
59.9	12	05	12
60.0	12	06	12
61.7	12	06	12
61.8	13	00	12
63.5	13	00	12
63.6	13	01	12
65.3	13	01	12
65.4	13	02	12
67.1	13	02	12
67.2	13	03	12
68.9	13	03	12
69.0	13	04	12
70.6	13	04	12
70.7	13	05	12
72.4	13	05	12
72.5	13	06	12
74.2	13	06	12
74.3	14	00	12
76.0	14	00	12
76.1	14	01	12
77.7	14	01	12
77.8	14	02	12
79.5	14	02	12
79.6	14	03	12
81.3	14	03	12
81.4	14	04	12
83.0	14	04	12
83.1	14	05	12
84.8	14	05	12
84.9	14	06	12
86.5	14	06	12
86.6	15	00	12
88.3	15	00	12
88.4	15	01	12
90.0	15	01	12
90.1	15	02	12
91.8	15	02	12
91.9	15	03	12
93.5	15	03	12
93.6	15	04	12
95.2	15	04	12
95.3	15	05	12
97.0	15	05	12
97.1	15	06	12
98.7	15	06	12
98.8	16	00	12
100.5	16	00	12
100.6	16	01	12
102.2	16	01	12
102.3	16	02	12
103.9	16	02	12
104.0	16	03	12
105.6	16	03	12
105.7	16	04	12
107.4	16	04	12
107.5	16	05	12
109.1	16	05	12
109.2	16	06	12
110.8	16	06	12
110.9	17	00	12

AC mm	wks	days	± 2SD
112.5	17	00	12
112.6	17	01	12
114.2	17	01	12
114.3	17	02	12
115.9	17	02	12
116.0	17	03	12
117.6	17	03	12
117.7	17	04	12
119.3	17	04	12
119.4	17	05	12
121.0	17	05	12
121.1	17	06	12
122.7	17	06	12
122.8	18	00	14
124.4	18	00	14
124.5	18	01	14
126.1	18	01	14
126.2	18	02	14
127.8	18	02	14
127.9	18	03	14
129.5	18	03	14
129.6	18	04	14
131.2	18	04	14
131.3	18	05	14
132.9	18	05	14
133.0	18	06	14
134.6	18	06	14
134.7	19	00	14
136.2	19	00	14
136.3	19	01	14
137.9	19	01	14
138.0	19	02	14
139.6	19	02	14
139.7	19	03	14
141.3	19	03	14
141.4	19	04	14
142.9	19	04	14
143.0	19	05	14
144.6	19	05	14
144.7	19	06	14
146.3	19	06	14
146.4	20	00	14
147.9	20	00	14
148.0	20	01	14
149.6	20	01	14
149.7	20	02	14
151.3	20	02	14
151.4	20	03	14
152.9	20	03	14
153.0	20	04	14
154.6	20	04	14
154.7	20	05	14
156.2	20	05	14
156.3	20	06	14
157.9	20	06	14
158.0	21	00	14
159.5	21	00	14
159.6	21	01	14
161.2	21	01	14
161.3	21	02	14
162.8	21	02	14
162.9	21	03	14
164.4	21	03	14
164.5	21	04	14
166.1	21	04	14
166.2	21	05	14
167.7	21	05	14
167.8	21	06	14
169.3	21	06	14
169.4	22	00	14
171.0	22	00	14

AC mm	wks	days	± 2SD
171.1	22	01	14
172.6	22	01	14
172.7	22	02	14
174.2	22	02	14
174.3	22	03	14
175.9	22	03	14
176.0	22	04	14
177.5	22	04	14
177.6	22	05	14
179.1	22	05	14
179.2	22	06	14
180.7	22	06	14
180.8	23	00	14
182.3	23	00	14
182.4	23	01	14
184.0	23	01	14
184.1	23	02	14
185.6	23	02	14
185.7	23	03	14
187.2	23	03	14
187.3	23	04	14
188.8	23	04	14
188.9	23	05	14
190.4	23	05	14
190.5	23	06	14
192.0	23	06	14
192.1	24	00	15
193.6	24	00	15
193.7	24	01	15
195.2	24	01	15
195.3	24	02	15
196.8	24	02	15
196.9	24	03	15
198.4	24	03	15
198.5	24	04	15
200.0	24	04	15
200.1	24	05	15
201.6	24	05	15
201.7	24	06	15
203.2	24	06	15
203.3	25	00	15
204.8	25	00	15
204.9	25	01	15
206.3	25	01	15
206.4	25	02	15
207.9	25	02	15
208.0	25	03	15
209.5	25	03	15
209.6	25	04	15
211.1	25	04	15
211.2	25	05	15
212.7	25	05	15
212.8	25	06	15
214.2	25	06	15
214.3	26	00	15
215.8	26	00	15
215.9	26	01	15
217.4	26	01	15
217.5	26	02	15
218.9	26	02	15
219.0	26	03	15
220.5	26	03	15
220.6	26	04	15
222.1	26	04	15
222.2	26	05	15
223.6	26	05	15
223.7	26	06	15
225.2	26	06	15
225.3	27	00	15
226.8	27	00	15
226.9	27	01	15

AC mm	wks	days	± 2SD
228.3	27	01	15
228.4	27	02	15
229.9	27	02	15
230.0	27	03	15
231.4	27	03	15
231.5	27	04	15
233.0	27	04	15
233.1	27	05	15
234.5	27	05	15
234.6	27	06	15
236.1	27	06	15
236.2	28	00	15
237.6	28	00	15
237.7	28	01	15
239.2	28	01	15
239.3	28	02	15
240.7	28	02	15
240.8	28	03	15
242.3	28	03	15
242.4	28	04	15
243.8	28	04	15
243.9	28	05	15
245.3	28	05	15
245.4	28	06	15
246.9	28	06	15
247.0	29	00	15
248.4	29	00	15
248.5	29	01	15
249.9	29	01	15
250.0	29	02	15
251.5	29	02	15
251.6	29	03	15
253.0	29	03	15
253.1	29	04	15
254.5	29	04	15
254.6	29	05	15
256.1	29	05	15
256.2	29	06	15
257.6	29	06	15
257.7	30	00	21
259.1	30	00	21
259.2	30	01	21
260.6	30	01	21
260.7	30	02	21
262.1	30	02	21
262.2	30	03	21
263.7	30	03	21
263.8	30	04	21
265.2	30	04	21
265.3	30	05	21
266.7	30	05	21
266.8	30	06	21
268.2	30	06	21
268.3	31	00	21
269.7	31	00	21
269.8	31	01	21
271.2	31	01	21
271.3	31	02	21
272.7	31	02	21
272.8	31	03	21
274.2	31	03	21
274.3	31	04	21
275.7	31	04	21
275.8	31	05	21
277.2	31	05	21
277.3	31	06	21
278.7	31	06	21
278.8	32	00	21
280.2	32	00	21
280.3	32	01	21
281.7	32	01	21

AC mm	wks	days	± 2SD
281.8	32	02	21
283.2	32	02	21
283.3	32	03	21
284.7	32	03	21
284.8	32	04	21
286.2	32	04	21
286.3	32	05	21
287.7	32	05	21
287.8	32	06	21
289.2	32	06	21
289.3	33	00	21
290.6	33	00	21
290.7	33	01	21
292.1	33	01	21
292.2	33	02	21
293.6	33	02	21
293.7	33	03	21
295.1	33	03	21
295.2	33	04	21
296.6	33	04	21
296.7	33	05	21
298.0	33	05	21
298.1	33	06	21
299.5	33	06	21
299.6	34	00	21
301.0	34	00	21
301.1	34	01	21
302.5	34	01	21
302.6	34	02	21
303.9	34	02	21
304.0	34	03	21
305.4	34	03	21
305.5	34	04	21
306.9	34	04	21
307.0	34	05	21
308.3	34	05	21
308.4	34	06	21
309.8	34	06	21
309.9	35	00	21
311.3	35	00	21
311.4	35	01	21
312.7	35	01	21
312.8	35	02	21
314.2	35	02	21
314.3	35	03	21
315.6	35	03	21
315.7	35	04	21
317.1	35	04	21
317.2	35	05	21
318.6	35	05	21
318.7	35	06	21
320.0	35	06	21
320.1	36	00	21
321.5	36	00	21
321.6	36	01	21
322.9	36	01	21
323.0	36	02	21
324.4	36	02	21
324.5	36	03	21
325.8	36	03	21
325.9	36	04	21
327.3	36	04	21
327.4	36	05	21
328.7	36	05	21
328.8	36	06	21
330.1	36	06	21
330.2	37	00	21
331.6	37	00	21
331.7	37	01	21
333.0	37	01	21
333.1	37	02	21

AC mm	wks	days	± 2SD
334.5	37	02	21
334.6	37	03	21
335.9	37	03	21
336.0	37	04	21
337.3	37	04	21
337.4	37	05	21
338.8	37	05	21
338.9	37	06	21
340.2	37	06	21
340.3	38	00	21
341.6	38	00	21
341.7	38	01	21
343.1	38	01	21
343.2	38	02	21
344.5	38	02	21
344.6	38	03	21
345.9	38	03	21
346.0	38	04	21
347.3	38	04	21
347.4	38	05	21
348.8	38	05	21
348.9	38	06	21
350.2	38	06	21
350.3	39	00	21
351.6	39	00	21
351.7	39	01	21
353.0	39	01	21
353.1	39	02	21
354.4	39	02	21
354.5	39	03	21
355.9	39	03	21
356.0	39	04	21
357.3	39	04	21
357.4	39	05	21
358.7	39	05	21
358.8	39	06	21
360.1	39	06	21
360.2	40	00	21
361.5	40	00	21
361.6	40	01	21
362.9	40	01	21
363.0	40	02	21
364.3	40	02	21
364.4	40	03	21
365.7	40	03	21
365.8	40	04	21
367.1	40	04	21
367.2	40	05	21
368.5	40	05	21
368.6	40	06	21
369.9	40	06	21
370.0	41	00	21
371.3	41	00	21
371.4	41	01	21
372.7	41	01	21
372.8	41	02	21
374.1	41	02	21
374.2	41	03	21
375.5	41	03	21
375.6	41	04	21
376.9	41	04	21
377.0	41	05	21
378.3	41	05	21
378.4	41	06	21
379.7	41	06	21
379.8	42	00	21
381.0	42	00	21

Abdominal Circumference, Merz

Merz E. *Ultrasound in Gynecology and Obstetrics*. Stuttgart and New York: Thieme Medical Publishers, Inc., 1991, p. 326.

AC mm	wks	days	± 2SD	AC mm	wks	days	± 2SD	AC mm	wks	days	± 2SD	AC mm	wks	days	± 2SD	AC mm	wks	days	± 2SD	AC mm	wks	days	± 2SD
56.0	12	01	10	106.0	16	06	12	156.0	21	04	13	206.0	26	03	15	256.0	31	01	17	306.0	35	06	18
58.0	12	02	11	108.0	17	01	11	158.0	21	06	13	208.0	26	04	15	258.0	31	02	17	308.0	36	01	17
60.0	12	04	10	110.0	17	02	11	160.0	22	00	13	210.0	26	06	15	260.0	31	04	17	310.0	36	02	18
62.0	12	05	10	112.0	17	03	12	162.0	22	01	15	212.0	27	00	15	262.0	31	05	17	312.0	36	04	17
64.0	12	06	11	114.0	17	04	12	164.0	22	03	13	214.0	27	01	15	264.0	31	06	17	314.0	36	04	19
66.0	13	01	10	116.0	17	06	11	166.0	22	04	13	216.0	27	02	16	266.0	32	01	17	316.0	36	06	18
68.0	13	02	11	118.0	18	00	12	168.0	22	06	13	218.0	27	04	15	268.0	32	02	17	318.0	37	00	18
70.0	13	04	10	120.0	18	01	12	170.0	23	00	13	220.0	27	05	16	270.0	32	04	17	320.0	37	01	19
72.0	13	04	11	122.0	18	03	12	172.0	23	01	15	222.0	27	06	16	272.0	32	05	17	322.0	37	03	18
74.0	13	06	11	124.0	18	04	12	174.0	23	02	15	224.0	28	01	15	274.0	32	06	17	324.0	37	04	19
76.0	14	00	11	126.0	18	06	11	176.0	23	04	13	226.0	28	02	16	276.0	33	00	18	326.0	37	06	18
78.0	14	01	12	128.0	19	00	12	178.0	23	05	15	228.0	28	04	15	278.0	33	01	18	328.0	38	00	18
80.0	14	03	11	130.0	19	01	12	180.0	23	06	15	230.0	28	05	16	280.0	33	03	18	330.0	38	01	19
82.0	14	04	11	132.0	19	02	13	182.0	24	01	15	232.0	28	06	16	282.0	33	04	18	332.0	38	03	18
84.0	14	06	11	134.0	19	04	12	184.0	24	02	15	234.0	29	00	16	284.0	33	06	17	334.0	38	04	19
86.0	15	00	11	136.0	19	05	12	186.0	24	04	13	236.0	29	01	17	286.0	34	00	18	336.0	38	05	19
88.0	15	01	12	138.0	19	06	13	188.0	24	05	15	238.0	29	03	16	288.0	34	01	18	338.0	38	06	19
90.0	15	03	11	140.0	20	01	12	190.0	24	06	15	240.0	29	04	17	290.0	34	03	18	340.0	39	01	19
92.0	15	04	11	142.0	20	02	13	192.0	25	00	16	242.0	29	06	16	292.0	34	04	18	342.0	39	02	19
94.0	15	05	12	144.0	20	04	12	194.0	25	01	16	244.0	30	00	16	294.0	34	05	18	344.0	39	04	19
96.0	15	06	12	146.0	20	05	12	196.0	25	03	15	246.0	30	01	17	296.0	34	06	19	346.0	39	05	19
98.0	16	01	12	148.0	20	06	13	198.0	25	04	16	248.0	30	03	16	298.0	35	01	17	348.0	39	06	19
100.0	16	02	12	150.0	21	01	12	200.0	25	06	15	250.0	30	04	17	300.0	35	02	18				
102.0	16	04	11	152.0	21	01	15	202.0	26	00	16	252.0	30	06	16	302.0	35	04	17				
104.0	16	05	12	154.0	21	03	13	204.0	26	01	15	254.0	30	06	17	304.0	35	05	18				

Abdominal Circumference, Lasser

Lasser DM, Peisner DB, Vollebergh J, Timor-Tritsch I. "First-trimester fetal biometry using transvaginal sonography." *Ultrasound in Obstetrics and Gynecology* 3:104, 1993.

AC mm	wks	days	± 2SD	AC mm	wks	days	± 2SD	AC mm	wks	days	± 2SD	AC mm	wks	days	± 2SD	AC mm	wks	days	± 2SD	AC mm	wks	days	± 2SD
30.9	08	05	06	36.4	09	05	06	42.7	10	05	06	50.2	11	05	06	59.0	12	05	06	69.3	13	05	06
31.7	08	06	06	37.2	09	06	06	43.7	10	06	06	51.4	11	06	06	60.4	12	06	06	70.9	13	06	06
32.4	09	00	06	38.1	10	00	06	44.8	11	00	06	52.6	12	00	06	61.8	13	00	06	72.6	14	00	06
33.2	09	01	06	39.0	10	01	06	45.8	11	01	06	53.8	12	01	06	63.2	13	01	06	74.3	14	01	06
34.0	09	02	06	39.9	10	02	06	46.9	11	02	06	55.1	12	02	06	64.7	13	02	06	76.0	14	02	06
34.7	09	03	06	40.8	10	03	06	48.0	11	03	06	56.4	12	03	06	66.2	13	03	06				
35.6	09	04	06	41.8	10	04	06	49.1	11	04	06	57.7	12	04	06	67.8	13	04	06				

Abdominal Circumference, JSUM

Japan Society of Ultrasonics in Medicine. "Standardization of Fetometry and Official Announcement of Diagnostic Guidelines." *J. Med. Ultrasonics* 28:844-872, 2001.

AC mm	- 1SD	days	+ 1SD	AC mm	- 1SD	days	+ 1SD	AC mm	- 1SD	days	+ 1SD	AC mm	- 1SD	days	+ 1SD	AC mm	- 1SD	days	+ 1SD	AC mm	- 1SD	days	+ 1SD
100.0	8	108	8	140.0	9	137	9	180.0	11	164	11	220.0	12	192	12	260.0	13	223	13	300.0	14	259	14
105.0	8	112	8	145.0	9	140	9	185.0	11	167	11	225.0	12	196	12	265.0	13	227	13	305.0	14	264	14
110.0	8	116	8	150.0	10	143	10	190.0	11	171	11	230.0	12	200	12	270.0	13	232	13	310.0	15	268	15
115.0	8	119	8	155.0	10	147	10	195.0	11	174	11	235.0	12	203	12	275.0	14	236	14	315.0	15	273	15
120.0	9	123	9	160.0	10	150	10	200.0	11	178	11	240.0	13	207	13	280.0	14	240	14	320.0	15	279	15
125.0	9	126	9	165.0	10	154	10	205.0	11	181	11	245.0	13	211	13	285.0	14	245	14	325.0	15	284	15
130.0	9	130	9	170.0	10	157	10	210.0	12	185	12	250.0	13	215	13	290.0	14	249	14				
135.0	9	133	9	175.0	10	160	10	215.0	12	189	12	255.0	13	219	13	295.0	14	254	14				

AXT, Tokyo

Masuda H, Shinozuka N, Okai T, Mizuno M. "Diagnosis of the Week of Pregnancy and Prognosis." *Perinatal Care* 8:719-726.

AXT = APTD * TTD

Anteroposterior Trunk Diameter multiplied by Transverse Trunk Diameter

AXT cm^2	mean days	± days	AXT cm^2	mean days	± days	AXT cm^2	mean days	± days	AXT cm^2	mean days	± days	AXT cm^2	mean days	± days	AXT cm^2	mean days	± days
21.0	141	14	34.0	173	14	47.0	200	21	60.0	224	21	73.0	247	21	86.0	270	28
22.0	144	14	35.0	176	21	48.0	202	21	61.0	226	21	74.0	249	21	87.0	272	28
23.0	147	14	36.0	178	21	49.0	204	21	62.0	228	21	75.0	251	28	88.0	274	28
24.0	150	14	37.0	180	21	50.0	206	21	63.0	229	21	76.0	252	28	89.0	276	28
25.0	152	14	38.0	182	21	51.0	208	21	64.0	231	21	77.0	254	28	90.0	278	28
26.0	155	14	39.0	184	21	52.0	209	21	65.0	233	21	78.0	256	28	91.0	280	28
27.0	157	14	40.0	186	21	53.0	211	21	66.0	235	21	79.0	258	28	92.0	282	28
28.0	160	14	41.0	188	21	54.0	213	21	67.0	237	21	80.0	260	28	93.0	284	28
29.0	162	14	42.0	190	21	55.0	215	21	68.0	238	21	81.0	261	28	94.0	286	28
30.0	164	14	43.0	192	21	56.0	217	21	69.0	240	21	82.0	263	28	95.0	287	28
31.0	167	14	44.0	194	21	57.0	219	21	70.0	242	21	83.0	265	28			
32.0	169	14	45.0	196	21	58.0	220	21	71.0	244	21	84.0	267	28			
33.0	171	14	46.0	198	21	59.0	222	21	72.0	245	21	85.0	269	28			

Fetal Trunk Area, Osaka

Aoki M, Yamada M. "Examining Fetal Growth." *Obstetrics and Gynecology* 47:547-556, 1983.

FTA cm²	days	FTA cm²	days	FTA cm²	days	FTA cm²	days	FTA cm²	days	FTA cm²	days
6.0	100	20.0	144	34.0	177	48.0	205	62.0	231	76.0	258
7.0	104	21.0	147	35.0	179	49.0	207	63.0	233	77.0	260
8.0	108	22.0	149	36.0	181	50.0	209	64.0	235	78.0	262
9.0	111	23.0	152	37.0	183	51.0	210	65.0	236	79.0	264
10.0	115	24.0	154	38.0	185	52.0	212	66.0	238	80.0	266
11.0	118	25.0	157	39.0	187	53.0	214	67.0	240	81.0	268
12.0	121	26.0	159	40.0	189	54.0	216	68.0	242	82.0	270
13.0	124	27.0	161	41.0	191	55.0	218	69.0	244	83.0	272
14.0	127	28.0	164	42.0	193	56.0	220	70.0	246	84.0	274
15.0	130	29.0	166	43.0	195	57.0	222	71.0	248	85.0	276
16.0	133	30.0	168	44.0	197	58.0	223	72.0	250	86.0	279
17.0	136	31.0	170	45.0	199	59.0	225	73.0	252		
18.0	139	32.0	173	46.0	201	60.0	227	74.0	254		
19.0	142	33.0	175	47.0	203	61.0	229	75.0	256		

Femur Length, Hadlock

Hadlock FP, Deter RL, Harrist RB, Park SK. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters." *Radiology* 152:497, 1984.

MA = 10.35 + 2.460 *(FL) + 0.170 *(FL²)

± 2 Standard Deviations		
	12-18 wk ± 1.38 wk (10 days)	30-36 wk ± 2.96 wk (21 days)
	18-24 wk ± 1.80 wk (13 days)	36-42 wk ± 3.12 wk (22 days)
	24-30 wk ± 2.08 wk (15 days)	

FL mm	wks	days	± 2SD	FL mm	wks	days	± 2SD	FL mm	wks	days	± 2SD	FL mm	wks	days	± 2SD	FL mm	wks	days	± 2SD	FL mm	wks	days	± 2SD
7.0	12	01	10	23.6	17	01	10	37.8	22	01	13	50.5	27	01	15	61.9	32	01	21	72.5	37	01	22
7.2	12	01	10	23.9	17	01	10	38.1	22	01	13	50.7	27	01	15	62.1	32	01	21	72.6	37	01	22
7.3	12	02	10	24.0	17	02	10	38.2	22	02	13	50.8	27	02	15	62.2	32	02	21	72.7	37	02	22
7.7	12	02	10	24.3	17	02	10	38.5	22	02	13	51.0	27	02	15	62.4	32	02	21	72.9	37	02	22
7.8	12	03	10	24.4	17	03	10	38.6	22	03	13	51.1	27	03	15	62.5	32	03	21	73.0	37	03	22
8.2	12	03	10	24.8	17	03	10	38.9	22	03	13	51.4	27	03	15	62.7	32	03	21	73.2	37	03	22
8.3	12	04	10	24.9	17	04	10	39.0	22	04	13	51.5	27	04	15	62.8	32	04	21	73.3	37	04	22
8.7	12	04	10	25.2	17	04	10	39.2	22	04	13	51.7	27	04	15	63.1	32	04	21	73.5	37	04	22
8.8	12	05	10	25.3	17	05	10	39.3	22	05	13	51.8	27	05	15	63.2	32	05	21	73.6	37	05	22
9.3	12	05	10	25.6	17	05	10	39.6	22	05	13	52.1	27	05	15	63.4	32	05	21	73.8	37	05	22
9.4	12	06	10	25.7	17	06	10	39.7	22	06	13	52.2	27	06	15	63.5	32	06	21	73.9	37	06	22
9.8	12	06	10	26.0	17	06	10	40.0	22	06	13	52.4	27	06	15	63.7	32	06	21	74.1	37	06	22
9.9	13	00	10	26.1	18	00	13	40.1	23	00	13	52.5	28	00	15	63.8	33	00	21	74.2	38	00	22
10.3	13	00	10	26.5	18	00	13	40.4	23	00	13	52.7	28	00	15	64.0	33	00	21	74.4	38	00	22
10.4	13	01	10	26.6	18	01	13	40.5	23	01	13	52.8	28	01	15	64.1	33	01	21	74.5	38	01	22
10.8	13	01	10	26.9	18	01	13	40.7	23	01	13	53.1	28	01	15	64.3	33	01	21	74.7	38	01	22
10.9	13	02	10	27.0	18	02	13	40.8	23	02	13	53.2	28	02	15	64.4	33	02	21	74.8	38	02	22
11.3	13	02	10	27.3	18	02	13	41.1	23	02	13	53.4	28	02	15	64.6	33	02	21	74.9	38	02	22
11.4	13	03	10	27.4	18	03	13	41.2	23	03	13	53.5	28	03	15	64.7	33	03	21	75.0	38	03	22
11.8	13	03	10	27.7	18	03	13	41.5	23	03	13	53.7	28	03	15	64.9	33	03	21	75.2	38	03	22
11.9	13	04	10	27.8	18	04	13	41.6	23	04	13	53.8	28	04	15	65.0	33	04	21	75.3	38	04	22
12.3	13	04	10	28.2	18	04	13	41.9	23	04	13	54.1	28	04	15	65.2	33	04	21	75.5	38	04	22
12.4	13	05	10	28.3	18	05	13	42.0	23	05	13	54.2	28	05	15	65.3	33	05	21	75.6	38	05	22
12.8	13	05	10	28.6	18	05	13	42.2	23	05	13	54.4	28	05	15	65.5	33	05	21	75.8	38	05	22
12.9	13	06	10	28.7	18	06	13	42.3	23	06	13	54.5	28	06	15	65.6	33	06	21	75.9	38	06	22
13.3	13	06	10	29.0	18	06	13	42.6	23	06	13	54.7	28	06	15	65.8	33	06	21	76.1	38	06	22
13.4	14	00	10	29.1	19	00	13	42.7	24	00	15	54.8	29	00	15	65.9	34	00	21	76.2	39	00	22
13.8	14	00	10	29.4	19	00	13	43.0	24	00	15	55.1	29	00	15	66.1	34	00	21	76.4	39	00	22
13.9	14	01	10	29.5	19	01	13	43.1	24	01	15	55.2	29	01	15	66.2	34	01	21	76.5	39	01	22
14.2	14	01	10	29.8	19	01	13	43.3	24	01	15	55.4	29	01	15	66.4	34	01	21	76.6	39	01	22
14.3	14	02	10	29.9	19	02	13	43.4	24	02	15	55.5	29	02	15	66.5	34	02	21	76.7	39	02	22
14.7	14	02	10	30.2	19	02	13	43.7	24	02	15	55.7	29	02	15	66.7	34	02	21	76.9	39	02	22
14.8	14	03	10	30.3	19	03	13	43.8	24	03	15	55.8	29	03	15	66.8	34	03	21	77.0	39	03	22
15.2	14	03	10	30.6	19	03	13	44.0	24	03	15	56.0	29	03	15	67.0	34	03	21	77.2	39	03	22
15.3	14	04	10	30.7	19	04	13	44.1	24	04	15	56.1	29	04	15	67.1	34	04	21	77.3	39	04	22
15.7	14	04	10	31.0	19	04	13	44.4	24	04	15	56.4	29	04	15	67.3	34	04	21	77.5	39	04	22
15.8	14	05	10	31.1	19	05	13	44.5	24	05	15	56.5	29	05	15	67.4	34	05	21	77.6	39	05	22
16.2	14	05	10	31.4	19	05	13	44.8	24	05	15	56.7	29	05	15	67.6	34	05	21	77.8	39	05	22
16.3	14	06	10	31.5	19	06	13	44.9	24	06	15	56.8	29	06	15	67.7	34	06	21	77.9	39	06	22
16.6	14	06	10	31.9	19	06	13	45.1	24	06	15	57.0	29	06	15	67.9	34	06	21	78.0	39	06	22
16.7	15	00	10	32.0	20	00	13	45.2	25	00	15	57.1	30	00	21	68.0	35	00	21	78.1	40	00	22
17.1	15	00	10	32.3	20	00	13	45.5	25	00	15	57.3	30	00	21	68.2	35	00	21	78.3	40	00	22
17.2	15	01	10	32.4	20	01	13	45.6	25	01	15	57.4	30	01	21	68.3	35	01	21	78.4	40	01	22
17.6	15	01	10	32.7	20	01	13	45.8	25	01	15	57.7	30	01	21	68.5	35	01	21	78.6	40	01	22
17.7	15	02	10	32.8	20	02	13	45.9	25	02	15	57.8	30	02	21	68.6	35	02	21	78.7	40	02	22
18.0	15	02	10	33.1	20	02	13	46.2	25	02	15	58.0	30	02	21	68.8	35	02	21	78.9	40	02	22
18.1	15	03	10	33.2	20	03	13	46.3	25	03	15	58.1	30	03	21	68.9	35	03	21	79.0	40	03	22
18.5	15	03	10	33.5	20	03	13	46.5	25	03	15	58.3	30	03	21	69.1	35	03	21	79.2	40	03	22
18.6	15	04	10	33.6	20	04	13	46.6	25	04	15	58.4	30	04	21	69.2	35	04	21	79.3	40	04	22
19.0	15	04	10	33.8	20	04	13	46.9	25	04	15	58.6	30	04	21	69.4	35	04	21	79.4	40	04	22
19.1	15	05	10	33.9	20	05	13	47.0	25	05	15	58.7	30	05	21	69.5	35	05	21	79.5	40	05	22
19.4	15	05	10	34.2	20	05	13	47.2	25	05	15	59.0	30	05	21	69.7	35	05	21	79.7	40	05	22
19.5	15	06	10	34.3	20	06	13	47.3	25	06	15	59.1	30	06	21	69.8	35	06	21	79.8	40	06	22
19.9	15	06	10	34.6	20	06	13	47.6	25	06	15	59.3	30	06	21	70.0	35	06	21	80.0	40	06	22
20.0	16	00	10	34.7	21	00	13	47.7	26	00	15	59.4	31	00	21	70.1	36	00	22	80.1	41	00	22
20.3	16	00	10	35.0	21	00	13	47.9	26	00	15	59.6	31	00	21	70.3	36	00	22	80.3	41	00	22
20.4	16	01	10	35.1	21	01	13	48.0	26	01	15	59.7	31	01	21	70.4	36	01	22	80.4	41	01	22
20.8	16	01	10	35.4	21	01	13	48.3	26	01	15	59.9	31	01	21	70.6	36	01	22	80.5	41	01	22
20.9	16	02	10	35.5	21	02	13	48.4	26	02	15	60.0	31	02	21	70.7	36	02	22	80.6	41	02	22
21.2	16	02	10	35.8	21	02	13	48.6	26	02	15	60.2	31	02	21	70.9	36	02	22	80.8	41	02	22
21.3	16	03	10	35.9	21	03	13	48.7	26	03	15	60.3	31	03	21	71.0	36	03	22	80.9	41	03	22
21.7	16	03	10	36.2	21	03	13	49.0	26	03	15	60.5	31	03	21	71.2	36	03	22	81.1	41	03	22
21.8	16	04	10	36.3	21	04	13	49.1	26	04	15	60.6	31	04	21	71.3	36	04	22	81.2	41	04	22
22.1	16	04	10	36.6	21	04	13	49.3	26	04	15	60.9	31	04	21	71.5	36	04	22	81.4	41	04	22
22.2	16	05	10	36.7	21	05	13	49.4	26	05	15	61.0	31	05	21	71.6	36	05	22	81.5	41	05	22
22.6	16	05	10	37.0	21	05	13	49.7	26	05	15	61.2	31	05	21	71.8	36	05	22	81.6	41	05	22
22.7	16	06	10	37.1	21	06	13	49.8	26	06	15	61.3	31	06	21	71.9	36	06	22	81.7	41	06	22
23.0	16	06	10	37.4	21	06	13	50.0	26	06	15	61.5	31	06	21	72.1	36	06	22	81.9	41	06	22
23.1	17	00	10	37.5	22	00	13	50.1	27	00	15	61.6	32	00	21	72.2	37	00	22	82.0	42	00	22
23.5	17	00	10	37.7	22	00	13	50.4	27	00	15	61.8	32	00	21	72.4	37	00	22				

Femur Length, Merz

Merz E. *Ultrasound in Gynecology and Obstetrics*. Stuttgart and New York: Thieme Medical Publishers, Inc., 1991, p. 326.

FL mm	wks	days	± 2SD	FL mm	wks	days	± 2SD	FL mm	wks	days	± 2SD	FL mm	wks	days	± 2SD	FL mm	wks	days	± 2SD	FL mm	wks	days	± 2SD
10.0	12	02	11	22.0	16	04	11	34.0	20	06	13	46.0	25	03	15	58.0	30	01	17	70.0	35	03	18
11.0	12	05	10	23.0	16	06	11	35.0	21	01	15	47.0	25	06	15	59.0	30	04	17	71.0	35	06	18
12.0	13	02	10	24.0	17	01	12	36.0	21	04	13	48.0	26	01	16	60.0	31	00	17	72.0	36	02	18
13.0	13	04	11	25.0	17	04	13	37.0	21	06	15	49.0	26	04	15	61.0	31	04	17	73.0	36	06	18
14.0	13	05	11	26.0	17	06	13	38.0	22	02	13	50.0	26	6	16	62.0	31	06	17	74.0	37	02	19
15.0	14	00	11	27.0	18	02	13	39.0	22	05	15	51.0	27	02	16	63.0	32	02	17	75.0	37	05	18
16.0	14	03	11	28.0	18	04	13	40.0	23	01	15	52.0	27	05	16	64.0	32	06	17	76.0	38	01	19
17.0	14	05	11	29.0	19	00	13	41.0	23	03	15	53.0	28	01	16	65.0	33	01	17	77.0	38	05	18
18.0	15	01	11	30.0	19	03	12	42.0	23	06	15	54.0	28	04	17	66.0	33	04	17	78.0	39	01	19
19.0	15	03	11	31.0	19	05	12	43.0	24	01	15	55.0	29	00	17	67.0	34	01	17	79.0	39	04	19
20.0	15	06	11	32.0	20	01	12	44.0	24	04	16	56.0	29	03	17	68.0	34	04	17	80.0	40	01	18
21.0	16	01	11	33.0	20	04	13	45.0	25	00	16	57.0	29	06	17	69.0	35	00	18				

Femur Length, Jeanty

Jeanty P, Rodesch F, Delbeke D, Dumont JE. "Estimation of Gestational Age from Measurements of Fetal Long Bones." *Journal of Ultrasound in Medicine* 3:75, 1984.

MA = (9.5411757 + 0.2977451 * FL) + (0.0010388013 * FL^2)

FL mm	wks	days	± 2SD	FL mm	wks	days	± 2SD	FL mm	wks	days	± 2SD	FL mm	wks	days	± 2SD	FL mm	wks	days	± 2SD	FL mm	wks	days	± 2SD
10.0	12	04	19	23.8	17	02	19	36.8	21	06	19	48.7	26	04	19	60.1	31	01	19	70.8	35	06	19
10.1	12	05	19	24.2	17	02	19	36.9	22	00	19	49.0	26	04	19	60.2	31	02	19	71.0	35	06	19
10.5	12	05	19	24.3	17	03	19	37.2	22	00	19	49.1	26	05	19	60.5	31	02	19	71.1	36	00	19
10.6	12	06	19	24.6	17	03	19	37.3	22	01	19	49.4	26	05	19	60.6	31	03	19	71.3	36	00	19
10.9	12	06	19	24.7	17	04	19	37.6	22	01	19	49.5	26	06	19	60.8	31	03	19	71.4	36	01	19
11.0	13	00	19	25.0	17	04	19	37.7	22	02	19	49.7	26	06	19	60.9	31	04	19	71.6	36	01	19
11.4	13	00	19	25.1	17	05	19	38.0	22	02	19	49.8	27	00	19	61.1	31	04	19	71.7	36	02	19
11.5	13	01	19	25.4	17	05	19	38.1	22	03	19	50.1	27	00	19	61.2	31	05	19	71.9	36	02	19
11.8	13	01	19	25.5	17	06	19	38.3	22	03	19	50.2	27	01	19	61.5	31	05	19	72.0	36	03	19
11.9	13	02	19	25.8	17	06	19	38.4	22	04	19	50.4	27	01	19	61.6	31	06	19	72.3	36	03	19
12.2	13	02	19	25.9	18	00	19	38.7	22	04	19	50.5	27	02	19	61.8	31	06	19	72.4	36	04	19
12.3	13	03	19	26.2	18	00	19	38.8	22	05	19	50.8	27	02	19	61.9	32	00	19	72.6	36	04	19
12.7	13	03	19	26.3	18	01	19	39.1	22	05	19	50.9	27	03	19	62.1	32	00	19	72.7	36	05	19
12.8	13	04	19	26.6	18	01	19	39.2	22	06	19	51.1	27	03	19	62.2	32	01	19	72.9	36	05	19
13.1	13	04	19	26.7	18	02	19	39.5	22	06	19	51.2	27	04	19	62.5	32	01	19	73.0	36	06	19
13.2	13	05	19	27.0	18	02	19	39.6	23	00	19	51.5	27	04	19	62.6	32	02	19	73.2	36	06	19
13.6	13	05	19	27.1	18	03	19	39.8	23	00	19	51.6	27	05	19	62.8	32	02	19	73.3	37	00	19
13.7	13	06	19	27.4	18	03	19	39.9	23	01	19	51.8	27	05	19	62.9	32	03	19	73.5	37	00	19
14.0	13	06	19	27.5	18	04	19	40.2	23	01	19	51.9	27	06	19	63.1	32	03	19	73.6	37	01	19
14.1	14	00	19	27.8	18	04	19	40.3	23	02	19	52.2	27	06	19	63.2	32	04	19	73.8	37	01	19
14.4	14	00	19	27.9	18	05	19	40.6	23	02	19	52.3	28	00	19	63.5	32	04	19	73.9	37	02	19
14.5	14	01	19	28.2	18	05	19	40.7	23	03	19	52.5	28	00	19	63.6	32	05	19	74.2	37	02	19
14.9	14	01	19	28.3	18	06	19	41.0	23	03	19	52.6	28	01	19	63.8	32	05	19	74.3	37	03	19
15.0	14	02	19	28.6	18	06	19	41.1	23	04	19	52.9	28	01	19	63.9	32	06	19	74.5	37	03	19
15.3	14	02	19	28.7	19	00	19	41.3	23	04	19	53.0	28	02	19	64.1	32	06	19	74.6	37	04	19
15.4	14	03	19	29.0	19	00	19	41.4	23	05	19	53.2	28	02	19	64.2	33	00	19	74.8	37	04	19
15.7	14	03	19	29.1	19	01	19	41.7	23	05	19	53.3	28	03	19	64.5	33	00	19	74.9	37	05	19
15.8	14	04	19	29.4	19	01	19	41.8	23	06	19	53.6	28	03	19	64.6	33	01	19	75.1	37	05	19
16.2	14	04	19	29.5	19	02	19	42.1	23	06	19	53.7	28	04	19	64.8	33	01	19	75.2	37	06	19
16.3	14	05	19	29.8	19	02	19	42.2	24	00	19	53.9	28	04	19	64.9	33	02	19	75.4	37	06	19
16.6	14	05	19	29.9	19	03	19	42.4	24	00	19	54.0	28	05	19	65.1	33	02	19	75.5	38	00	19
16.7	14	06	19	30.2	19	03	19	42.5	24	01	19	54.3	28	05	19	65.2	33	03	19	75.7	38	00	19
17.0	14	06	19	30.3	19	04	19	42.8	24	01	19	54.4	28	06	19	65.4	33	03	19	75.8	38	01	19
17.1	15	00	19	30.6	19	04	19	42.9	24	02	19	54.6	28	06	19	65.5	33	04	19	76.0	38	01	19
17.5	15	00	19	30.7	19	05	19	43.2	24	02	19	54.7	29	00	19	65.8	33	04	19	76.1	38	02	19
17.6	15	01	19	31.0	19	05	19	43.3	24	03	19	55.0	29	00	19	65.9	33	05	19	76.4	38	02	19
17.9	15	01	19	31.1	19	06	19	43.6	24	03	19	55.1	29	01	19	66.1	33	05	19	76.5	38	03	19
18.0	15	02	19	31.4	19	06	19	43.7	24	04	19	55.3	29	01	19	66.2	33	06	19	76.7	38	03	19
18.3	15	02	19	31.5	20	00	19	43.9	24	04	19	55.4	29	02	19	66.4	33	06	19	76.8	38	04	19
18.4	15	03	19	31.8	20	00	19	44.0	24	05	19	55.7	29	02	19	66.5	34	00	19	77.0	38	04	19
18.7	15	03	19	31.9	20	01	19	44.3	24	05	19	55.8	29	03	19	66.8	34	00	19	77.1	38	05	19
18.8	15	04	19	32.2	20	01	19	44.4	24	06	19	56.0	29	03	19	66.9	34	01	19	77.3	38	05	19
19.2	15	04	19	32.3	20	02	19	44.7	24	06	19	56.1	29	04	19	67.1	34	01	19	77.4	38	06	19
19.3	15	05	19	32.6	20	02	19	44.8	25	00	19	56.4	29	04	19	67.2	34	02	19	77.6	38	06	19
19.6	15	05	19	32.7	20	03	19	45.0	25	00	19	56.5	29	05	19	67.4	34	02	19	77.7	39	00	19
19.7	15	06	19	33.0	20	03	19	45.1	25	01	19	56.7	29	05	19	67.5	34	03	19	77.9	39	00	19
20.0	15	06	19	33.1	20	04	19	45.4	25	01	19	56.8	29	06	19	67.7	34	03	19	78.0	39	01	19
20.1	16	00	19	33.3	20	04	19	45.5	25	02	19	57.0	29	06	19	67.8	34	04	19	78.2	39	01	19
20.4	16	00	19	33.4	20	05	19	45.8	25	02	19	57.1	30	00	19	68.1	34	04	19	78.3	39	02	19
20.5	16	01	19	33.7	20	05	19	45.9	25	03	19	57.4	30	00	19	68.2	34	05	19	78.5	39	02	19
20.8	16	01	19	33.8	20	06	19	46.1	25	03	19	57.5	30	01	19	68.4	34	05	19	78.6	39	03	19
20.9	16	02	19	34.1	20	06	19	46.2	25	04	19	57.7	30	01	19	68.5	34	06	19	78.8	39	03	19
21.3	16	02	19	34.2	21	00	19	46.5	25	04	19	57.8	30	02	19	68.7	34	06	19	78.9	39	04	19
21.4	16	03	19	34.5	21	00	19	46.6	25	05	19	58.1	30	02	19	68.8	35	00	19	79.2	39	04	19
21.7	16	03	19	34.6	21	01	19	46.8	25	05	19	58.2	30	03	19	69.0	35	00	19	79.3	39	05	19
21.8	16	04	19	34.9	21	01	19	46.9	25	06	19	58.4	30	03	19	69.1	35	01	19	79.5	39	05	19
22.1	16	04	19	35.0	21	02	19	47.2	25	06	19	58.5	30	04	19	69.4	35	01	19	79.6	39	06	19
22.2	16	05	19	35.3	21	02	19	47.3	26	00	19	58.8	30	04	19	69.5	35	02	19	79.8	39	06	19
22.5	16	05	19	35.4	21	03	19	47.6	26	00	19	58.9	30	05	19	69.7	35	02	19	79.9	40	00	19
22.6	16	06	19	35.7	21	03	19	47.7	26	01	19	59.1	30	05	19	69.8	35	03	19	80.0	40	00	19
22.9	16	06	19	35.8	21	04	19	47.9	26	01	19	59.2	30	06	19	70.0	35	03	19				
23.0	17	00	19	36.0	21	04	19	48.0	26	02	19	59.4	30	06	19	70.1	35	04	19				
23.3	17	00	19	36.1	21	05	19	48.3	26	02	19	59.5	31	00	19	70.3	35	04	19				
23.4	17	01	19	36.4	21	05	19	48.4	26	03	19	59.8	31	00	19	70.4	35	05	19				
23.7	17	01	19	36.5	21	06	19	48.6	26	03	19	59.9	31	01	19	70.7	35	05	19				

Femur Length, Tokyo

Masuda H, Shinozuka N, Okai T, Mizuno M. "Diagnosis of the Week of Pregnancy and Prognosis." *Perinatal Care* 8:719-726.

FL mm	mean days	± days	FL mm	mean days	± days	FL mm	mean days	± days	FL mm	mean days	± days	FL mm	mean days	± days	FL mm	mean days	± days
33.0	142	7	40.0	165	14	47.0	187	21	54.0	210	28	61.0	234	28	68.0	265	28
34.0	146	7	41.0	168	14	48.0	190	21	55.0	213	28	62.0	238	28	69.0	271	28
35.0	149	7	42.0	171	14	49.0	194	21	56.0	217	28	63.0	242	28	70.0	278	28
36.0	152	7	43.0	175	14	50.0	197	21	57.0	220	28	64.0	246	28	71.0	285	28
37.0	155	7	44.0	178	14	51.0	200	21	58.0	223	28	65.0	251	28			
38.0	159	14	45.0	181	14	52.0	203	28	59.0	227	28	66.0	255	28			
39.0	162	14	46.0	184	21	53.0	206	28	60.0	231	28	67.0	260	28			

Femur Length, Osaka

Aoki M, Yamada M. "Examining Fetal Growth." *Obstetrics and Gynecology* 47:547-556, 1983.

FL mm	mean days	± days	FL mm	mean days	± days	FL mm	mean days	± days	FL mm	mean days	± days	FL mm	mean days	± days	FL mm	mean days	± days
10.0	92	7	21.0	117	14	32.0	144	14	43.0	174	14	54.0	209	---	65.0	251	---
11.0	95	7	22.0	119	14	33.0	147	14	44.0	177	14	55.0	212	---	66.0	255	---
12.0	97	7	23.0	122	14	34.0	149	14	45.0	180	14	56.0	216	---	67.0	259	---
13.0	99	7	24.0	124	14	35.0	152	14	46.0	183	14	57.0	219	---	68.0	264	---
14.0	101	7	25.0	127	14	36.0	155	14	47.0	186	14	58.0	223	---	69.0	269	---
15.0	103	7	26.0	129	14	37.0	157	14	48.0	189	---	59.0	227	---	70.0	274	---
16.0	106	14	27.0	132	14	38.0	160	14	49.0	193	---	60.0	231	---	71.0	279	---
17.0	108	14	28.0	134	14	39.0	163	14	50.0	196	---	61.0	234	---			
18.0	110	14	29.0	137	14	40.0	166	14	51.0	199	---	62.0	239	---			
19.0	112	14	30.0	139	14	41.0	169	14	52.0	202	---	63.0	243	---			
20.0	115	14	31.0	142	14	42.0	171	14	53.0	206	---	64.0	246	---			

Femur Length, JSUM

Japan Society of Ultrasonics in Medicine. "Standardization of Fetometry and Official Announcement of Diagnostic Guidelines." *J. Med. Ultrasonics* 28:844-872, 2001.

FL mm	mean days	± days	FL mm	mean days	± days	FL mm	mean days	± days	FL mm	mean days	± days	FL mm	mean days	± days	FL mm	mean days	± days
20.0	113	6	29.0	134	7	38.0	159	9	47.0	187	10	56.0	219	11	65.0	254	12
21.0	115	6	30.0	137	8	39.0	162	9	48.0	191	10	57.0	223	11	66.0	259	12
22.0	118	6	31.0	140	8	40.0	165	9	49.0	194	10	58.0	227	11	67.0	263	13
23.0	120	7	32.0	142	8	41.0	168	9	50.0	198	10	59.0	231	12	68.0	267	13
24.0	122	7	33.0	145	8	42.0	171	9	51.0	201	10	60.0	234	12	69.0	271	13
25.0	125	7	34.0	148	8	43.0	174	9	52.0	205	11	61.0	238	12	70.0	276	13
26.0	127	7	35.0	150	8	44.0	178	9	53.0	208	11	62.0	242	12			
27.0	129	7	36.0	153	8	45.0	181	10	54.0	212	11	63.0	246	12			
28.0	132	7	37.0	156	9	46.0	184	10	55.0	215	11	64.0	250	12			

Humerus Length, Jeanty

Jeanty P, Rodesch F, Delbeke D, Dumont JE. "Estimation of Gestational Age from Measurements of Fetal Long Bones." *Journal of Ultrasound in Medicine* 3:75, 1984.

$MA = 9.6519438 + (0.26200391 * HL) + (0.0026105367 * HL^2)$

±2 Standard Deviations = ±3.3104 wks

HL mm	wks	days	± 2SD	HL mm	wks	days	± 2SD	HL mm	wks	days	± 2SD	HL mm	wks	days	± 2SD	HL mm	wks	days	± 2SD	HL mm	wks	days	± 2SD
9.0	12	02	23	22.7	17	00	23	34.2	21	05	23	44.3	26	03	23	53.4	31	01	23	61.8	35	06	23
9.4	12	02	23	23.0	17	00	23	34.4	21	05	23	44.5	26	03	23	53.6	31	01	23	61.9	35	06	23
9.5	12	03	23	23.1	17	01	23	34.5	21	06	23	44.6	26	04	23	53.7	31	02	23	62.0	36	00	23
9.8	12	03	23	23.4	17	01	23	34.7	21	06	23	44.8	26	04	23	53.8	31	02	23	62.2	36	00	23
9.9	12	04	23	23.5	17	02	23	34.8	22	00	23	44.9	26	05	23	53.9	31	03	23	62.3	36	01	23
10.3	12	04	23	23.7	17	02	23	35.1	22	00	23	45.1	26	05	23	54.1	31	03	23	62.4	36	01	23
10.4	12	05	23	23.8	17	03	23	35.2	22	01	23	45.2	26	06	23	54.2	31	04	23	62.5	36	02	23
10.7	12	05	23	24.1	17	03	23	35.4	22	01	23	45.4	26	06	23	54.4	31	04	23	62.7	36	02	23
10.8	12	06	23	24.2	17	04	23	35.5	22	02	23	45.5	27	00	23	54.5	31	05	23	62.8	36	03	23
11.2	12	06	23	24.5	17	04	23	35.7	22	02	23	45.6	27	00	23	54.6	31	05	23	62.9	36	03	23
11.3	13	00	23	24.6	17	05	23	35.8	22	03	23	45.7	27	01	23	54.7	31	06	23	63.0	36	04	23
11.6	13	00	23	24.8	17	05	23	36.0	22	03	23	45.9	27	01	23	54.9	31	06	23	63.2	36	04	23
11.7	13	01	23	24.9	17	06	23	36.1	22	04	23	46.0	27	02	23	55.0	32	00	23	63.3	36	05	23
12.1	13	01	23	25.2	17	06	23	36.3	22	04	23	46.2	27	02	23	55.2	32	00	23	63.4	36	05	23
12.2	13	02	23	25.3	18	00	23	36.4	22	05	23	46.3	27	03	23	55.3	32	01	23	63.5	36	06	23
12.5	13	02	23	25.6	18	00	23	36.7	22	05	23	46.5	27	03	23	55.4	32	01	23	63.6	36	06	23
12.6	13	03	23	25.7	18	01	23	36.8	22	06	23	46.6	27	04	23	55.5	32	02	23	63.7	37	00	23
13.0	13	03	23	25.9	18	01	23	37.0	22	06	23	46.8	27	04	23	55.7	32	02	23	63.9	37	00	23
13.1	13	04	23	26.0	18	02	23	37.1	23	00	23	46.9	27	05	23	55.8	32	03	23	64.0	37	01	23
13.4	13	04	23	26.3	18	02	23	37.3	23	00	23	47.1	27	05	23	55.9	32	03	23	64.1	37	01	23
13.5	13	05	23	26.4	18	03	23	37.4	23	01	23	47.2	27	06	23	56.0	32	04	23	64.2	37	02	23
13.8	13	05	23	26.6	18	03	23	37.6	23	01	23	47.3	27	06	23	56.2	32	04	23	64.4	37	02	23
13.9	13	06	23	26.7	18	04	23	37.7	23	02	23	47.4	28	00	23	56.3	32	05	23	64.5	37	03	23
14.2	13	06	23	27.0	18	04	23	37.9	23	02	23	47.6	28	00	23	56.4	32	05	23	64.6	37	03	23
14.3	14	00	23	27.1	18	05	23	38.0	23	03	23	47.7	28	01	23	56.5	32	06	23	64.7	37	04	23
14.7	14	00	23	27.3	18	05	23	38.2	23	03	23	47.9	28	01	23	56.7	32	06	23	64.8	37	04	23
14.8	14	01	23	27.4	18	06	23	38.3	23	04	23	48.0	28	02	23	56.8	33	00	23	64.9	37	05	23
15.1	14	01	23	27.7	18	06	23	38.5	23	04	23	48.2	28	02	23	57.0	33	00	23	65.1	37	05	23
15.2	14	02	23	27.8	18	00	23	38.6	23	05	23	48.3	28	03	23	57.1	33	01	23	65.2	37	06	23
15.5	14	02	23	28.0	19	00	23	38.8	23	05	23	48.5	28	03	23	57.2	33	01	23	65.3	37	06	23
15.6	14	03	23	28.1	19	01	23	38.9	23	06	23	48.6	28	04	23	57.3	33	02	23	65.4	38	00	23
15.9	14	03	23	28.4	19	01	23	39.1	23	06	23	48.7	28	04	23	57.5	33	02	23	65.5	38	00	23
16.0	14	04	23	28.5	19	02	23	39.2	24	00	23	48.8	28	05	23	57.6	33	03	23	65.6	38	01	23
16.3	14	04	23	28.7	19	02	23	39.4	24	00	23	49.0	28	05	23	57.7	33	03	23	65.8	38	01	23
16.4	14	05	23	28.8	19	03	23	39.5	24	01	23	49.1	28	06	23	57.8	33	04	23	65.9	38	02	23
16.7	14	05	23	29.1	19	03	23	39.7	24	01	23	49.3	28	06	23	58.0	33	04	23	66.0	38	02	23
16.8	14	06	23	29.2	19	04	23	39.8	24	02	23	49.4	29	00	23	58.1	33	05	23	66.1	38	03	23
17.1	14	06	23	29.4	19	04	23	40.1	24	02	23	49.6	29	00	23	58.2	33	05	23	66.3	38	03	23
17.2	15	00	23	29.5	19	05	23	40.2	24	03	23	49.7	29	01	23	58.3	33	06	23	66.4	38	04	23
17.5	15	00	23	29.8	19	05	23	40.4	24	03	23	49.8	29	01	23	58.5	33	06	23	66.5	38	04	23
17.6	15	01	23	29.9	19	06	23	40.5	24	04	23	49.9	29	02	23	58.6	34	00	23	66.6	38	05	23
18.0	15	01	23	30.1	19	06	23	40.7	24	04	23	50.1	29	02	23	58.7	34	00	23	66.7	38	05	23
18.1	15	02	23	30.2	20	00	23	40.8	24	05	23	50.2	29	03	23	58.8	34	01	23	66.8	38	06	23
18.4	15	02	23	30.4	20	00	23	41.0	24	05	23	50.4	29	03	23	59.0	34	01	23	67.0	38	06	23
18.5	15	03	23	30.5	20	01	23	41.1	24	06	23	50.5	29	04	23	59.1	34	02	23	67.1	39	00	23
18.7	15	03	23	30.8	20	01	23	41.3	24	06	23	50.6	29	04	23	59.2	34	02	23	67.2	39	00	23
18.8	15	04	23	30.9	20	02	23	41.4	25	00	23	50.7	29	05	23	59.3	34	03	23	67.3	39	01	23
19.1	15	04	23	31.1	20	02	23	41.6	25	00	23	50.9	29	05	23	59.5	34	03	23	67.4	39	01	23
19.2	15	05	23	31.2	20	03	23	41.7	25	01	23	51.0	29	06	23	59.6	34	04	23	67.5	39	02	23
19.5	15	05	23	31.5	20	03	23	41.9	25	01	23	51.2	29	06	23	59.7	34	04	23	67.7	39	02	23
19.6	15	06	23	31.6	20	04	23	42.0	25	02	23	51.3	30	00	23	59.8	34	05	23	67.8	39	03	23
19.9	15	06	23	31.8	20	04	23	42.1	25	02	23	51.5	30	00	23	60.0	34	05	23	67.9	39	03	23
20.0	16	00	23	31.9	20	05	23	42.2	25	03	23	51.6	30	01	23	60.1	34	06	23	68.0	39	04	23
20.3	16	00	23	32.1	20	05	23	42.4	25	03	23	51.7	30	01	23	60.2	34	06	23	68.1	39	04	23
20.4	16	01	23	32.2	20	06	23	42.5	25	04	23	51.8	30	02	23	60.3	35	00	23	68.2	39	05	23
20.7	16	01	23	32.5	20	06	23	42.7	25	04	23	52.0	30	02	23	60.5	35	00	23	68.3	39	05	23
20.8	16	02	23	32.6	21	00	23	42.8	25	05	23	52.1	30	03	23	60.6	35	01	23	68.4	39	06	23
21.1	16	02	23	32.8	21	00	23	43.0	25	05	23	52.3	30	03	23	60.7	35	01	23	68.6	39	06	23
21.2	16	03	23	32.9	21	01	23	43.1	25	06	23	52.4	30	04	23	60.8	35	02	23	68.7	40	00	23
21.5	16	03	23	33.1	21	01	23	43.3	25	06	23	52.5	30	04	23	61.0	35	02	23	68.8	40	00	23
21.6	16	04	23	33.2	21	02	23	43.4	26	00	23	52.6	30	05	23	61.1	35	03	23	68.9	40	01	23
21.9	16	04	23	33.4	21	02	23	43.6	26	00	23	52.8	30	05	23	61.2	35	03	23	69.0	40	01	23
22.0	16	05	23	33.5	21	03	23	43.7	26	01	23	52.9	30	06	23	61.3	35	04	23				
22.2	16	05	23	33.8	21	03	23	43.9	26	01	23	53.1	30	06	23	61.5	35	04	23				
22.3	16	06	23	33.9	21	04	23	44.0	26	02	23	53.2	31	00	23	61.6	35	05	23				
22.6	16	06	23	34.1	21	04	23	44.2	26	02	23	53.3	31	00	23	61.7	35	05	23				

Humerus Length, Osaka

Aoki M, Yamada M. "Examining Fetal Growth." *Obstetrics and Gynecology* 47:547-556, 1983.

HL mm	mean days	± days	HL mm	mean days	± days	HL mm	mean days	± days	HL mm	mean days	± days	HL mm	mean days	± days	HL mm	mean days	± days
10.0	91	7	19.0	113	7	28.0	137	14	37.0	164	---	46.0	196	---	55.0	236	---
11.0	93	7	20.0	115	7	29.0	140	14	38.0	167	---	47.0	200	---	56.0	242	---
12.0	95	7	21.0	118	7	30.0	142	14	39.0	171	---	48.0	204	---	57.0	247	---
13.0	98	7	22.0	121	14	31.0	145	14	40.0	174	---	49.0	208	---	58.0	254	---
14.0	100	7	23.0	123	14	32.0	148	14	41.0	177	---	50.0	212	---	59.0	260	---
15.0	103	7	24.0	126	14	33.0	151	14	42.0	181	---	51.0	217	---	60.0	267	---
16.0	105	7	25.0	128	14	34.0	154	14	43.0	185	---	52.0	221	---	61.0	275	---
17.0	108	7	26.0	131	14	35.0	158	14	44.0	188	---	53.0	226	---			
18.0	110	7	27.0	134	14	36.0	161	14	45.0	192	---	54.0	231	---			

Ulna Length, Jeanty

Jeanty P, Rodesch F, Delbeke D, Dumont JE. "Estimation of Gestational Age from Measurements of Fetal Long Bones." *Journal of Ultrasound in Medicine* 3:75, 1984.

MAwks(ULmm)=10.034368 + (0.28625722 * UL) + (0.002912470 * UL^2)

2 Standard Deviations = ±3.6874 wks

UL mm	wks	days	± 2SD	UL mm	wks	days	± 2SD	UL mm	wks	days	± 2SD	UL mm	wks	days	± 2SD	UL mm	wks	days	± 2SD	UL mm	wks	days	± 2SD
9.0	12	06	26	21.8	17	05	26	32.7	22	04	26	42.4	27	03	26	51.1	32	02	26	59.1	37	01	26
9.2	12	06	26	22.1	17	05	26	32.9	22	04	26	42.5	27	03	26	51.2	32	02	26	59.2	37	01	26
9.3	13	00	26	22.2	17	06	26	33.0	22	05	26	42.6	27	04	26	51.3	32	03	26	59.3	37	02	26
9.6	13	00	26	22.4	17	06	26	33.2	22	05	26	42.8	27	04	26	51.4	32	03	26	59.4	37	02	26
9.7	13	01	26	22.5	18	00	26	33.3	22	06	26	42.9	27	05	26	51.5	32	04	26	59.5	37	03	26
10.0	13	01	26	22.7	18	00	26	33.5	22	06	26	43.1	27	05	26	51.7	32	04	26	59.6	37	03	26
10.1	13	02	26	22.8	18	01	26	33.6	23	00	26	43.2	27	06	26	51.8	32	05	26	59.7	37	04	26
10.4	13	02	26	23.1	18	01	26	33.8	23	00	26	43.3	27	06	26	51.9	32	05	26	59.9	37	04	26
10.5	13	03	26	23.2	18	02	26	33.9	23	01	26	43.4	28	00	26	52.0	32	06	26	60.0	37	05	26
10.8	13	03	26	23.4	18	02	26	34.1	23	01	26	43.6	28	00	26	52.2	32	06	26	60.1	37	05	26
10.9	13	04	26	23.5	18	03	26	34.2	23	02	26	43.7	28	01	26	52.3	33	00	26	60.2	37	06	26
11.3	13	04	26	23.8	18	03	26	34.4	23	02	26	43.9	28	01	26	52.4	33	00	26	60.3	37	06	26
11.4	13	05	26	23.9	18	04	26	34.5	23	03	26	44.0	28	02	26	52.5	33	01	26	60.4	38	00	26
11.7	13	05	26	24.1	18	04	26	34.7	23	03	26	44.1	28	02	26	52.7	33	01	26	60.5	38	00	26
11.8	13	06	26	24.2	18	05	26	34.8	23	04	26	44.2	28	03	26	52.8	33	02	26	60.6	38	01	26
12.1	13	06	26	24.4	18	05	26	35.0	23	04	26	44.4	28	03	26	52.9	33	02	26	60.8	38	01	26
12.2	14	00	26	24.5	18	06	26	35.1	23	05	26	44.5	28	04	26	53.0	33	03	26	60.9	38	02	26
12.5	14	00	26	24.8	18	06	26	35.3	23	05	26	44.6	28	04	26	53.1	33	03	26	61.0	38	02	26
12.6	14	01	26	24.9	19	00	26	35.4	23	06	26	44.7	28	05	26	53.2	33	04	26	61.1	38	03	26
12.9	14	01	26	25.1	19	00	26	35.6	23	06	26	44.9	28	05	26	53.4	33	04	26	61.2	38	03	26
13.0	14	02	26	25.2	19	01	26	35.7	24	00	26	45.0	28	06	26	53.5	33	05	26	61.3	38	04	26
13.3	14	02	26	25.4	19	01	26	35.9	24	00	26	45.2	28	06	26	53.6	33	05	26	61.4	38	04	26
13.4	14	03	26	25.5	19	02	26	36.0	24	01	26	45.3	29	00	26	53.7	33	06	26	61.5	38	05	26
13.6	14	03	26	25.7	19	02	26	36.2	24	01	26	45.4	29	00	26	53.9	33	06	26	61.7	38	05	26
13.7	14	04	26	25.8	19	03	26	36.3	24	02	26	45.5	29	01	26	54.0	34	00	26	61.8	38	06	26
14.0	14	04	26	26.1	19	03	26	36.4	24	02	26	45.7	29	01	26	54.1	34	00	26	61.9	38	06	26
14.1	14	05	26	26.2	19	04	26	36.5	24	03	26	45.8	29	02	26	54.2	34	01	26	62.0	39	00	26
14.4	14	05	26	26.4	19	04	26	36.7	24	03	26	45.9	29	02	26	54.3	34	01	26	62.1	39	00	26
14.5	14	06	26	26.5	19	05	26	36.8	24	04	26	46.0	29	03	26	54.4	34	02	26	62.2	39	01	26
14.8	14	06	26	26.7	19	05	26	37.0	24	04	26	46.2	29	03	26	54.6	34	02	26	62.3	39	01	26
14.9	15	00	26	26.8	19	06	26	37.1	24	05	26	46.3	29	04	26	54.7	34	03	26	62.4	39	02	26
15.2	15	00	26	27.0	19	06	26	37.3	24	05	26	46.5	29	04	26	54.8	34	03	26	62.5	39	02	26
15.3	15	01	26	27.1	20	00	26	37.4	24	06	26	46.6	29	05	26	54.9	34	04	26	62.6	39	03	26
15.6	15	01	26	27.4	20	00	26	37.6	24	06	26	46.7	29	05	26	55.0	34	04	26	62.8	39	03	26
15.7	15	02	26	27.5	20	01	26	37.7	25	00	26	46.8	29	06	26	55.1	34	05	26	62.9	39	04	26
15.9	15	02	26	27.7	20	01	26	37.9	25	00	26	47.0	29	06	26	55.3	34	05	26	63.0	39	04	26
16.0	15	03	26	27.8	20	02	26	38.0	25	01	26	47.1	30	00	26	55.4	34	06	26	63.1	39	05	26
16.3	15	03	26	28.0	20	02	26	38.1	25	01	26	47.2	30	00	26	55.5	34	06	26	63.2	39	05	26
16.4	15	04	26	28.1	20	03	26	38.2	25	02	26	47.3	30	01	26	55.6	35	00	26	63.3	39	06	26
16.7	15	04	26	28.3	20	03	26	38.4	25	02	26	47.5	30	01	26	55.7	35	00	26	63.4	39	06	26
16.8	15	05	26	28.4	20	04	26	38.5	25	03	26	47.6	30	02	26	55.8	35	01	26	63.5	40	00	26
17.1	15	05	26	28.6	20	04	26	38.7	25	03	26	47.7	30	02	26	56.0	35	01	26	63.6	40	00	26
17.2	15	06	26	28.7	20	05	26	38.8	25	04	26	47.8	30	03	26	56.1	35	02	26	63.7	40	01	26
17.4	15	06	26	29.0	20	05	26	39.0	25	04	26	48.0	30	03	26	56.2	35	02	26	63.8	40	01	26
17.5	16	00	26	29.1	20	06	26	39.1	25	05	26	48.1	30	04	26	56.3	35	03	26	63.9	40	02	26
17.8	16	00	26	29.3	20	06	26	39.3	25	05	26	48.2	30	04	26	56.4	35	03	26	64.1	40	02	26
17.9	16	01	26	29.4	21	00	26	39.4	25	06	26	48.3	30	05	26	56.5	35	04	26	64.2	40	03	26
18.2	16	01	26	29.6	21	00	26	39.5	25	06	26	48.5	30	05	26	56.7	35	04	26	64.3	40	03	26
18.3	16	02	26	29.7	21	01	26	39.6	26	00	26	48.6	30	06	26	56.8	35	05	26	64.4	40	04	26
18.5	16	02	26	29.9	21	01	26	39.8	26	00	26	48.7	30	06	26	56.9	35	05	26	64.5	40	04	26
18.6	16	03	26	30.0	21	02	26	39.9	26	01	26	48.8	31	00	26	57.0	35	06	26	64.6	40	05	26
18.9	16	03	26	30.2	21	02	26	40.1	26	01	26	49.0	31	00	26	57.1	35	06	26	64.7	40	05	26
19.0	16	04	26	30.3	21	03	26	40.2	26	02	26	49.1	31	01	26	57.2	36	00	26	64.8	40	06	26
19.2	16	04	26	30.5	21	03	26	40.4	26	02	26	49.2	31	01	26	57.4	36	00	26	64.9	40	06	26
19.3	16	05	26	30.6	21	04	26	40.5	26	03	26	49.3	31	02	26	57.5	26	01	26	65.0	41	00	26
19.6	16	05	26	30.8	21	04	26	40.6	26	03	26	49.5	31	02	26	57.6	26	01	26	65.1	41	00	26
19.7	16	06	26	30.9	21	05	26	40.7	26	04	26	49.6	31	03	26	57.7	36	02	26	65.2	41	01	26
20.0	16	06	26	31.1	21	05	26	40.9	26	04	26	49.7	31	03	26	57.8	36	02	26	65.4	41	01	26
20.1	17	00	26	31.2	21	06	26	41.0	26	05	26	49.8	31	04	26	57.9	36	03	26	65.5	41	02	26
20.3	17	00	26	31.4	21	06	26	41.2	26	05	26	50.0	31	04	26	58.1	36	03	26	65.6	41	02	26
20.4	17	01	26	31.5	22	00	26	41.3	26	06	26	50.1	31	05	26	58.2	36	04	26	65.7	41	03	26
20.7	17	01	26	31.7	22	00	26	41.4	26	06	26	50.2	31	05	26	58.3	36	04	26	65.8	41	03	26
20.8	17	02	26	31.8	22	01	26	41.5	27	00	26	50.3	31	06	26	58.4	36	05	26	65.9	41	04	26
21.0	17	02	26	32.0	22	01	26	41.7	27	00	26	50.5	31	06	26	58.5	36	05	26	66.0	41	04	26
21.1	17	03	26	32.1	22	02	26	41.8	27	01	26	50.6	32	00	26	58.6	36	06	26				
21.4	17	03	26	32.3	22	02	26	42.0	27	01	26	50.7	32	00	26	58.7	36	06	26				
21.5	17	04	26	32.4	22	03	26	42.1	27	02	26	50.8	32	01	26	58.8	37	00	26				
21.7	17	04	26	32.6	22	03	26	42.3	27	02	26	51.0	32	01	26	59.0	37	00	26				

Binocular Distance, Jeanty

Jeanty P, Cantraine F, Cousaert E, Romero R, Hobbins JC. "The Binocular Distance: A New Way to Estimate Fetal Age." *Journal of Ultrasound in Medicine* 3:241, 1984.

BN mm	wks	days	± 2SD	BN mm	wks	days	± 2SD	BN mm	wks	days	± 2SD	BN mm	wks	days	± 2SD	BN mm	wks	days	± 2SD	BN mm	wks	days	± 2SD
15	10	3	29	24	15	6	28	33	21	1	29	42	26	1	28	51	31	6	28	60	37	1	29
16	11	0	29	25	16	3	28	34	21	5	29	43	27	6	28	52	32	4	28	61	37	6	28
17	11	4	29	26	17	0	28	35	22	2	29	44	27	5	28	53	33	0	29	62	38	3	28
18	12	1	29	27	17	4	28	36	22	6	29	45	28	2	28	54	33	4	29	63	39	0	28
19	12	6	28	28	18	1	29	37	23	4	28	46	28	6	28	55	34	1	29	64	39	4	28
20	13	3	28	29	18	6	28	38	24	1	28	47	29	4	28	56	34	6	28	65	40	1	29
21	14	0	28	30	19	3	28	39	24	5	28	48	30	1	28	57	35	3	28				
22	14	4	28	31	20	0	28	40	25	5	28	49	30	5	28	58	36	0	28				
23	15	1	29	32	20	4	28	41	25	2	28	50	31	2	28	59	36	4	28				

Binocular Distance, Tongsong

Tongsong T, Wanapirak C, Jesadapornchai S, Tathayathikom E. "Fetal binocular distance as a predictor of menstrual age." International *Journal of Gynecology and Obstetrics* 38:87, 1992.

MAwks(BNcm)=6.54398 + 3.4659 *(BN) + 0.30682 * (BN^2)

±Standard Deviation 14 - 27 wk ± 14 days 29 - 40 wks ± 24 days

BN mm	wks	days	± 2SD	BN mm	wks	days	± 2SD	BN mm	wks	days	± 2SD	BN mm	wks	days	± 2SD	BN mm	wks	days	± 2SD	BN mm	wks	days	± 2SD
16.0	12	06	00	25.6	17	03	14	34.4	22	01	24	42.4	26	05	24	49.8	31	03	24	56.7	36	00	24
16.1	12	06	00	25.7	17	04	14	34.6	22	01	24	42.5	26	06	24	49.9	31	03	24	56.8	36	01	24
16.2	13	00	00	26.0	17	04	14	34.7	22	02	24	42.6	26	06	24	50.0	31	04	24	56.9	36	01	24
16.4	13	00	00	26.1	17	05	14	34.8	22	02	24	42.7	27	00	24	50.1	31	04	24	57.0	36	02	24
16.5	13	01	00	26.3	17	05	14	34.9	22	03	24	42.9	27	00	24	50.2	31	05	24	57.1	36	02	24
16.7	13	01	00	26.4	17	06	14	35.1	22	03	24	43.0	27	01	24	50.3	31	05	24	57.2	36	03	24
16.8	13	02	00	26.5	17	06	14	35.2	22	04	24	43.1	27	01	24	50.4	31	06	24	57.3	36	03	24
17.0	13	02	00	26.6	18	00	24	35.3	22	04	24	43.2	27	02	24	50.5	31	06	24	57.4	36	04	24
17.1	13	03	00	26.8	18	00	24	35.4	22	05	24	43.3	27	02	24	50.6	32	00	24	57.5	36	04	24
17.3	13	03	00	26.9	18	01	24	35.6	22	05	24	43.4	27	03	24	50.8	32	00	24	57.6	36	05	24
17.4	13	04	00	27.1	18	01	24	35.7	22	06	24	43.6	27	03	24	50.9	32	01	24	57.7	36	05	24
17.7	13	04	00	27.2	18	02	24	35.8	22	06	24	43.7	27	04	24	51.0	32	01	24	57.8	36	06	24
17.8	13	05	00	27.4	18	02	24	35.9	23	00	24	43.8	27	04	24	51.1	32	02	24	57.9	36	06	24
18.0	13	05	00	27.5	18	03	24	36.1	23	00	24	43.9	27	05	24	51.2	32	02	24	58.0	37	00	24
18.1	13	06	00	27.7	18	03	24	36.2	23	01	24	44.0	27	05	24	51.3	32	03	24	58.1	37	00	24
18.3	13	06	00	27.8	18	04	24	36.3	23	01	24	44.1	27	06	24	51.4	32	03	24	58.2	37	01	24
18.4	14	00	14	27.9	18	04	24	36.4	23	02	24	44.3	27	06	24	51.5	32	04	24	58.3	37	01	24
18.6	14	00	14	28.0	18	05	24	36.6	23	02	24	44.4	28	00	24	51.6	32	04	24	58.4	37	02	24
18.7	14	01	14	28.2	18	05	24	36.7	23	03	24	44.5	28	00	24	51.7	32	05	24	58.5	37	02	24
18.9	14	01	14	28.3	18	06	24	36.8	23	03	24	44.6	28	01	24	51.8	32	05	24	58.6	37	03	24
19.0	14	02	14	28.5	18	06	24	36.9	23	04	24	44.7	28	01	24	51.9	32	06	24	58.7	37	03	24
19.2	14	02	14	28.6	19	00	24	37.1	23	04	24	44.8	28	02	24	52.0	32	06	24	58.8	37	04	24
19.3	14	03	14	28.8	19	00	24	37.2	23	05	24	45.0	28	02	24	52.1	33	00	24	58.9	37	04	24
19.5	14	03	14	28.9	19	01	24	37.3	23	05	24	45.1	28	03	24	52.3	33	00	24	59.0	37	05	24
19.6	14	04	14	29.0	19	01	24	37.4	23	06	24	45.2	28	03	24	52.4	33	01	24	59.1	37	05	24
19.8	14	04	14	29.1	19	02	24	37.6	23	06	24	45.3	28	04	24	52.5	33	01	24	59.2	37	06	24
19.9	14	05	14	29.3	19	02	24	37.7	24	00	24	45.4	28	04	24	52.6	33	02	24	59.3	37	06	24
20.1	14	05	14	29.4	19	03	24	37.8	24	00	24	45.5	28	05	24	52.7	33	02	24	59.4	38	00	24
20.2	14	06	14	29.6	19	03	24	37.9	24	01	24	45.6	28	05	24	52.8	33	03	24	59.5	38	00	24
20.4	14	06	14	29.7	19	04	24	38.1	24	01	24	45.7	28	06	24	52.9	33	03	24	59.6	38	01	24
20.5	15	00	14	29.8	19	04	24	38.2	24	02	24	45.9	28	06	24	53.0	33	04	24	59.7	38	01	24
20.7	15	00	14	29.9	19	05	24	38.3	24	02	24	46.0	29	00	24	53.1	33	04	24	59.8	38	02	24
20.8	15	01	14	30.1	19	05	24	38.4	24	03	24	46.1	29	00	24	53.2	33	05	24	59.9	38	02	24
21.0	15	01	14	30.2	19	06	24	38.6	24	03	24	46.2	29	01	24	53.3	33	05	24	60.0	38	03	24
21.1	15	02	14	30.4	19	06	24	38.7	24	04	24	46.3	29	01	24	53.4	33	06	24	60.1	38	03	24
21.3	15	02	14	30.5	20	00	24	38.8	24	04	24	46.4	29	02	24	53.5	33	06	24	60.2	38	04	24
21.4	15	03	14	30.6	20	00	24	38.9	24	05	24	46.5	29	02	24	53.6	34	00	24	60.3	38	04	24
21.6	15	03	14	30.7	20	01	24	39.0	24	05	24	46.6	29	03	24	53.8	34	00	24	60.4	38	05	24
21.7	15	04	14	30.9	20	01	24	39.1	24	06	24	46.8	29	03	24	53.9	34	01	24	60.5	38	05	24
21.9	15	04	14	31.0	20	02	24	39.3	24	06	24	46.9	29	04	24	54.0	34	01	24	60.6	38	06	24
22.0	15	05	14	31.2	20	02	24	39.4	25	00	24	47.0	29	04	24	54.1	34	02	24	60.7	38	06	24
22.2	15	05	14	31.3	20	03	24	39.5	25	00	24	47.1	29	05	24	54.2	34	02	24	60.8	39	00	24
22.3	15	06	14	31.4	20	03	24	39.6	25	01	24	47.2	29	05	24	54.3	34	03	24	60.9	39	00	24
22.5	15	06	14	31.5	20	04	24	39.8	25	01	24	47.3	29	06	24	54.4	34	03	24	61.0	39	01	24
22.6	16	00	14	31.7	20	04	24	39.9	25	02	24	47.4	29	06	24	54.5	34	04	24	61.1	39	01	24
22.8	16	00	14	31.8	20	05	24	40.0	25	02	24	47.5	30	00	24	54.6	34	04	24	61.2	39	02	24
22.9	16	01	14	32.0	20	05	24	40.1	25	03	24	47.7	30	00	24	54.7	34	05	24	61.3	39	02	24
23.1	16	01	14	32.1	20	06	24	40.3	25	03	24	47.8	30	01	24	54.8	34	05	24	61.4	39	03	24
23.2	16	02	14	32.2	20	06	24	40.4	25	04	24	47.9	30	01	24	54.9	34	06	24	61.5	39	03	24
23.4	16	02	14	32.3	21	00	24	40.5	25	04	24	48.0	30	02	24	55.0	34	06	24	61.6	39	04	24
23.5	16	03	14	32.5	21	00	24	40.6c	25	05	24	48.1	30	02	24	55.1	35	00	24	61.7	39	04	24
23.7	16	03	14	32.6	21	01	24	40.7	25	05	24	48.2	30	03	24	55.2	35	00	24	61.8	39	05	24
23.8	16	04	14	32.8	21	01	24	40.8	25	06	24	48.3	30	03	24	55.3	35	01	24	61.9	39	05	24
24.0	16	04	14	32.9	21	02	24	41.0	25	06	24	48.4	30	04	24	55.4	35	01	24	62.0	39	06	24
24.1	16	05	14	33.0	21	02	24	41.1	26	00	24	48.6	30	04	24	55.5	35	02	24	62.1	39	06	24
24.3	16	05	14	33.1	21	03	24	41.2	26	00	24	48.7	30	05	24	55.6	35	02	24	62.2	40	00	24
24.4	16	06	14	33.3	21	03	24	41.3	26	01	24	48.8	30	05	24	55.7	35	03	24	62.3	40	00	24
24.6	16	06	14	33.4	21	04	24	41.5	26	01	24	48.9	30	06	24	55.8	35	03	24	62.4	40	01	00
24.7	17	00	14	33.5	21	04	24	41.6	26	02	24	49.0	30	06	24	55.9	35	04	24	62.5	40	01	00
24.8	17	00	14	33.6	21	05	24	41.7	26	02	24	49.1	31	00	24	56.0	35	04	24	62.6	40	02	00
24.9	17	01	14	33.8	21	05	24	41.8	26	03	24	49.2	31	00	24	56.1	35	05	24	62.7	40	02	00
25.1	17	01	14	33.9	21	06	24	41.9	26	03	24	49.3	31	01	24	56.3	35	05	24	62.8	40	03	00
25.2	17	02	14	34.0	21	06	24	42.0	26	04	24	49.4	31	01	24	56.4	35	06	24	62.9	40	03	00
25.4	17	02	14	34.1	22	00	24	42.2	26	04	24	49.5	31	02	24	56.5	35	06	24	63.0	40	04	00
25.5	17	03	14	34.3	22	00	24	42.3	26	05	24	49.7	31	02	24	56.6	36	00	24				

Tibia Length, Jeanty

Jeanty P, Rodesch F, Delbeke D, Dumont JE. "Estimation of Gestational Age from Measurements of Fetal Long Bones." *Journal of Ultrasound in Medicine* 3:75, 1984.

$MAwks(TLmm)=10.055043 + 0.31317668 (TL) + (0.001681 * TL^2)$

2 Standard Deviations = ±3.4992 wks (24 days)

TL mm	wks	days	± 2SD	TL mm	wks	days	± 2SD	TL mm	wks	days	± 2SD	TL mm	wks	days	± 2SD	TL mm	wks	days	± 2SD	TL mm	wks	days	± 2SD
9.0	13	00	24	21.4	17	04	24	32.6	22	00	24	42.8	26	04	24	52.3	31	00	24	61.2	35	04	24
9.1	13	00	24	21.7	17	04	24	32.7	22	01	24	43.0	26	04	24	52.4	31	01	24	61.4	35	04	24
9.2	13	01	24	21.8	17	05	24	32.9	22	01	24	43.1	26	05	24	52.6	31	01	24	61.5	35	05	24
9.5	13	01	24	22.0	17	05	24	33.0	22	02	24	43.3	26	05	24	52.7	31	02	24	61.7	35	05	24
9.6	13	02	24	22.1	17	06	24	33.3	22	02	24	43.4	26	06	24	52.9	31	02	24	61.8	35	06	24
10.0	13	02	24	22.4	17	06	24	33.4	22	03	24	43.6	26	06	24	53.0	31	03	24	61.9	35	06	24
10.1	13	03	24	22.5	18	00	24	33.6	22	03	24	43.7	27	00	24	53.2	31	03	24	62.0	36	00	24
10.4	13	03	24	22.8	18	00	24	33.7	22	04	24	43.9	27	00	24	53.3	31	04	24	62.2	36	00	24
10.5	13	04	24	22.9	18	01	24	33.9	22	04	24	44.0	27	01	24	53.5	31	04	24	62.3	36	01	24
10.8	13	04	24	23.1	18	01	24	34.0	22	05	24	44.2	27	01	24	53.6	31	05	24	62.5	36	01	24
10.9	13	05	24	23.2	18	02	24	34.3	22	05	24	44.3	27	02	24	53.8	31	05	24	62.6	36	02	24
11.2	13	05	24	23.5	18	02	24	34.4	22	06	24	44.5	27	02	24	53.9	31	06	24	62.8	36	02	24
11.3	13	06	24	23.6	18	03	24	34.6	22	06	24	44.6	27	03	24	54.1	31	06	24	62.9	36	03	24
11.6	13	06	24	23.8	18	03	24	34.7	23	00	24	44.8	27	03	24	54.2	32	00	24	63.0	36	03	24
11.7	14	00	24	23.9	18	04	24	34.9	23	00	24	44.9	27	04	24	54.4	32	00	24	63.1	36	04	24
12.0	14	00	24	24.2	18	04	24	35.0	23	01	24	45.1	27	04	24	54.5	32	01	24	63.3	36	04	24
12.1	14	01	24	24.3	18	05	24	35.3	23	01	24	45.2	27	05	24	54.6	32	01	24	63.4	36	05	24
12.4	14	01	24	24.6	18	05	24	35.4	23	02	24	45.5	27	05	24	54.7	32	02	24	63.6	36	05	24
12.5	14	02	24	24.7	18	06	24	35.6	23	02	24	45.6	27	06	24	54.9	32	02	24	63.7	36	06	24
12.8	14	02	24	24.9	18	06	24	35.7	23	03	24	45.8	27	06	24	55.0	32	03	24	63.8	36	06	24
12.9	14	03	24	25.0	19	00	24	35.9	23	03	24	45.9	28	00	24	55.2	32	03	24	63.9	37	00	24
13.2	14	03	24	25.3	19	00	24	36.0	23	04	24	46.1	28	00	24	55.3	32	04	24	64.1	37	00	24
13.3	14	04	24	25.4	19	01	24	36.3	23	04	24	46.2	28	01	24	55.5	32	04	24	64.2	37	01	24
13.6	14	04	24	25.7	19	01	24	36.4	23	05	24	46.4	28	01	24	55.6	32	05	24	64.4	37	01	24
13.7	14	05	24	25.8	19	02	24	36.6	23	05	24	46.5	28	02	24	55.8	32	05	24	64.5	37	02	24
14.0	14	05	24	26.0	19	02	24	36.7	23	06	24	46.7	28	02	24	55.9	32	06	24	64.7	37	02	24
14.1	14	06	24	26.1	19	03	24	36.9	23	06	24	46.8	28	03	24	56.1	32	06	24	64.8	37	03	24
14.4	14	06	24	26.4	19	03	24	37.0	24	00	24	47.0	28	03	24	56.2	33	00	24	64.9	37	03	24
14.5	15	00	24	26.5	19	04	24	37.2	24	00	24	47.1	28	04	24	56.4	33	00	24	65.0	37	04	24
14.8	15	01	24	26.7	19	04	24	37.3	24	01	24	47.3	28	04	24	56.5	33	01	24	65.2	37	04	24
15.2	15	01	24	26.8	19	05	24	37.6	24	01	24	47.4	28	05	24	56.6	33	01	24	65.3	37	05	24
15.3	15	02	24	27.1	19	05	24	37.7	24	02	24	47.6	28	05	24	56.7	33	02	24	65.5	37	05	24
15.6	15	02	24	27.2	19	06	24	37.9	24	02	24	47.7	28	06	24	56.9	33	02	24	65.6	37	06	24
15.7	15	03	24	27.4	19	06	24	38.0	24	03	24	47.9	28	06	24	57.0	33	03	24	65.7	37	06	24
16.0	15	03	24	27.5	20	00	24	38.2	24	03	24	48.0	29	00	24	57.2	33	04	24	65.8	38	00	24
16.1	15	04	24	27.8	20	00	24	38.3	24	04	24	48.2	29	00	24	57.3	33	04	24	66.0	38	00	24
16.3	15	04	24	27.9	20	01	24	38.5	24	04	24	48.3	29	01	24	57.5	33	04	24	66.1	38	01	24
16.4	15	04	24	28.1	20	01	24	38.6	24	05	24	48.5	29	01	24	57.6	33	05	24	66.3	38	01	24
16.7	15	05	24	28.2	20	02	24	38.9	24	05	24	48.6	29	02	24	57.8	33	05	24	66.4	38	02	24
16.8	15	06	24	28.5	20	02	24	39.0	24	06	24	48.8	29	02	24	57.9	33	06	24	66.5	38	02	24
17.1	15	06	24	28.6	20	03	24	39.2	24	06	24	48.9	29	03	24	58.1	33	06	24	66.6	38	03	24
17.2	16	00	24	28.8	20	03	24	39.3	25	00	24	49.1	29	03	24	58.2	34	00	24	66.8	38	03	24
17.5	16	00	24	28.9	20	04	24	39.5	25	00	24	49.2	29	04	24	58.3	34	00	24	66.9	38	04	24
17.6	16	01	24	29.2	20	04	24	39.6	25	01	24	49.4	29	04	24	58.4	34	01	24	67.1	38	04	24
17.9	16	01	24	29.3	20	05	24	39.8	25	01	24	49.5	29	05	24	58.6	34	01	24	67.2	38	05	24
18.0	16	02	24	29.5	20	05	24	39.9	25	02	24	49.7	29	05	24	58.7	34	02	24	67.3	38	05	24
18.3	16	02	24	29.6	20	06	24	40.1	25	02	24	49.8	29	06	24	58.9	34	02	24	67.4	38	06	24
18.4	16	03	24	29.9	20	06	24	40.2	25	03	24	50.0	29	06	24	59.0	34	03	24	67.6	38	06	24
18.7	16	03	24	30.0	21	00	24	40.5	25	03	24	50.1	30	00	24	59.2	34	03	24	67.7	39	00	24
18.8	16	04	24	30.2	21	00	24	40.6	25	04	24	50.3	30	00	24	59.3	34	04	24	67.8	39	00	24
19.0	16	04	24	30.3	21	01	24	40.8	25	04	24	50.4	30	01	24	59.5	34	04	24	67.9	39	01	24
19.1	16	05	24	30.6	21	01	24	40.9	25	05	24	50.6	30	01	24	59.6	34	05	24	68.1	39	01	24
19.4	16	05	24	30.7	21	02	24	41.1	25	05	24	50.7	30	02	24	59.7	34	05	24	68.2	39	02	24
19.5	16	06	24	30.9	21	02	24	41.2	25	06	24	50.9	30	02	24	59.8	34	06	24	68.4	39	02	24
19.8	16	06	24	31.0	21	03	24	41.4	25	06	24	51.0	30	03	24	60.0	34	06	24	68.5	39	03	24
19.9	17	00	24	31.2	21	03	24	41.5	26	00	24	51.2	30	03	24	60.1	35	00	24	68.6	39	03	24
20.2	17	00	24	31.3	21	04	24	41.7	26	00	24	51.3	30	04	24	60.3	35	00	24	68.7	39	04	24
20.3	17	01	24	31.6	21	04	24	41.8	26	01	24	51.4	30	04	24	60.4	35	01	24	68.9	39	04	24
20.5	17	01	24	31.7	21	05	24	42.0	26	01	24	51.5	30	05	24	60.6	35	01	24	69.0	39	05	24
20.6	17	02	24	31.9	21	05	24	42.1	26	02	24	51.7	30	05	24	60.7	35	02	24				
20.9	17	02	24	32.0	21	06	24	42.4	26	02	24	51.8	30	06	24	60.8	35	02	24				
21.0	17	03	24	32.3	21	06	24	42.5	26	03	24	52.0	30	06	24	60.9	35	03	24				
21.3	17	03	24	32.4	22	00	24	42.7	26	03	24	52.1	31	00	24	61.1	35	03	24				

Foot Length, Mercer

Mercer BM, Sklar S, Shariatmadar A, Gillieson MS, Dalton ME. "Fetal foot length as a predictor of gestational age." *American Journal of Obstetrics and Gynecology* 156(2):350, 1987.

MAwks(FTmm)=0.0007745 * (FT^2) + 0.3004 (FT) + 9.397

2 Standard Deviations = 0.0797*MA (in weeks)

FT mm	wks	days	± 2SD	FT mm	wks	days	± 2SD	FT mm	wks	days	± 2SD	FT mm	wks	days	± 2SD	FT mm	wks	days	± 2SD	FT mm	wks	days	± 2SD
10.0	12	03	07	24.1	17	01	10	38.3	22	00	12	51.1	26	05	15	63.6	31	04	18	75.5	36	03	20
10.1	12	04	07	24.4	17	01	10	38.4	22	01	12	51.2	26	06	15	63.7	31	05	18	75.6	36	04	20
10.5	12	04	07	24.5	17	02	10	38.7	22	01	12	51.5	26	06	15	63.9	31	05	18	75.8	36	04	20
10.6	12	05	07	24.8	17	02	10	38.8	22	02	12	51.6	27	00	15	64.0	31	06	18	75.9	36	05	20
10.9	12	05	07	24.9	17	03	10	39.1	22	02	12	51.8	27	00	15	64.3	31	06	18	76.1	36	05	20
11.0	12	06	07	25.3	17	03	10	39.2	22	03	12	51.9	27	01	15	64.4	32	00	18	76.2	36	05	21
11.4	12	06	07	25.4	17	04	10	39.3	22	03	12	52.2	27	01	15	64.6	32	00	18	76.3	36	06	21
11.5	13	00	07	25.7	17	04	10	39.4	22	03	13	52.3	27	02	15	64.7	32	01	18	76.5	36	06	21
11.8	13	00	07	25.8	17	05	10	39.5	22	03	13	52.6	27	02	15	65.0	32	01	18	76.6	37	00	21
11.9	13	01	07	26.1	17	05	10	39.6	22	04	13	52.7	27	03	15	65.1	32	02	18	76.8	37	00	21
12.3	13	01	07	26.2	17	06	10	39.9	22	04	13	53.0	27	03	15	65.4	32	02	18	76.9	37	01	21
12.4	13	02	07	26.5	17	06	10	40.0	22	05	13	53.1	27	04	15	65.5	32	03	18	77.2	37	01	21
12.7	13	02	07	26.6	18	00	10	40.3	22	05	13	53.3	27	04	15	65.7	32	03	18	77.3	37	02	21
12.8	13	03	07	26.9	18	00	10	40.4	22	06	13	53.4	27	05	15	65.8	32	04	18	77.5	37	02	21
13.0	13	03	07	27.0	18	01	10	40.7	22	06	13	53.7	27	05	15	66.1	32	04	18	77.6	37	03	21
13.1	13	03	08	27.4	18	01	10	40.8	23	00	13	53.8	27	06	16	66.2	32	05	18	77.9	37	03	21
13.2	13	03	08	27.5	18	02	10	41.1	23	00	13	54.1	27	06	16	66.4	32	05	18	78.0	37	04	21
13.3	13	04	08	27.8	18	02	10	41.2	23	01	13	54.2	28	00	16	66.5	32	06	18	78.2	37	04	21
13.6	13	04	08	27.9	18	03	10	41.5	23	01	13	54.5	28	00	16	66.8	32	06	18	78.3	37	05	21
13.7	13	05	08	28.2	18	03	10	41.6	23	02	13	54.6	28	01	16	66.9	33	00	18	78.5	37	05	21
14.0	13	05	08	28.3	18	04	10	41.9	23	02	13	54.8	28	01	16	67.1	33	00	18	78.6	37	06	21
14.1	13	06	08	28.6	18	04	10	42.0	23	03	13	54.9	28	02	16	67.2	33	01	18	78.9	37	06	21
14.5	13	06	08	28.7	18	05	10	42.3	23	03	13	55.2	28	02	16	67.3	33	01	18	79.0	38	00	21
14.6	14	00	08	29.0	18	05	10	42.4	23	04	13	55.3	28	03	16	67.4	33	01	19	79.2	38	00	21
14.9	14	00	08	29.1	18	06	10	42.7	23	04	13	55.6	38	03	16	67.5	33	01	19	79.3	38	01	21
15.0	14	01	08	29.2	18	06	11	42.8	23	05	13	55.7	28	04	16	67.6	33	02	19	79.5	38	01	21
15.4	14	01	08	29.4	18	06	11	43.1	23	05	13	55.9	28	04	16	67.8	33	02	19	79.6	38	02	21
15.5	14	02	08	29.5	19	00	11	43.2	23	06	13	56.0	28	05	16	67.9	33	03	19	79.9	38	02	21
15.8	14	02	08	29.9	19	00	11	43.4	23	06	13	56.3	28	05	16	68.2	33	03	19	80.0	38	03	21
15.9	14	03	08	30.0	19	01	11	43.5	24	00	13	56.4	28	06	16	68.3	33	04	19	80.2	38	03	21
16.3	14	03	08	30.3	19	01	11	43.8	24	00	13	56.7	28	06	16	68.5	33	04	19	80.3	38	04	22
16.4	14	04	08	30.4	19	02	11	43.9	24	01	13	56.8	29	00	16	68.6	33	05	19	80.6	38	04	22
16.7	14	04	08	30.7	19	02	11	44.2	24	01	14	57.0	29	00	16	68.9	33	05	19	80.7	38	05	22
16.8	14	05	08	30.8	19	03	11	44.3	24	02	14	57.1	29	01	16	69.0	33	06	19	80.9	38	05	22
17.1	14	05	08	31.1	19	03	11	44.6	24	02	14	57.4	29	01	16	69.2	33	06	19	81.0	38	06	22
17.6	14	06	08	31.2	19	04	11	44.7	24	03	14	57.5	29	02	16	69.3	34	00	19	81.2	38	06	22
17.7	14	06	08	31.5	19	04	11	45.0	24	03	14	57.8	29	02	16	69.6	34	00	19	81.3	39	00	22
17.8	15	00	08	31.6	19	05	11	45.1	24	04	14	57.9	29	03	16	69.7	34	01	19	81.6	39	00	22
18.0	15	00	08	31.9	19	05	11	45.4	24	04	14	58.1	29	03	16	69.9	34	01	19	81.7	39	01	22
18.1	15	01	08	32.0	19	06	11	45.5	24	05	14	58.2	29	04	16	70.0	34	02	19	81.9	39	01	22
18.4	15	01	08	32.3	19	06	11	45.8	24	05	14	58.3	29	04	16	70.3	34	02	19	82.0	39	02	22
18.5	15	02	08	32.4	20	00	11	45.9	24	06	14	58.4	29	04	17	70.4	34	03	19	82.2	39	02	22
18.6	15	02	08	32.7	20	00	11	46.1	24	06	14	58.5	29	04	17	70.6	34	03	19	82.3	39	03	22
18.9	15	02	08	32.8	20	01	11	46.2	25	00	14	58.6	29	05	17	70.7	34	04	19	82.6	39	03	22
19.0	15	03	09	33.1	20	01	11	46.5	25	00	14	58.9	29	05	17	71.0	34	04	19	82.7	39	04	22
19.3	15	03	09	33.2	20	02	11	46.6	25	01	14	59.0	29	06	17	71.1	34	05	19	82.9	39	04	22
19.4	15	04	09	33.5	20	02	11	46.9	25	01	14	59.2	29	06	17	71.3	34	05	19	83.0	39	05	22
19.7	15	04	09	33.6	20	03	11	47.0	25	02	14	59.3	30	00	17	71.4	34	06	19	83.2	39	05	22
19.8	15	05	09	33.9	20	03	11	47.3	25	02	14	59.6	30	00	17	71.7	34	06	19	83.3	39	06	22
20.2	15	05	09	34.0	20	04	11	47.4	25	03	14	59.7	30	01	17	71.8	35	00	20	83.6	39	06	22
20.3	15	06	09	34.3	20	04	11	47.7	25	03	14	60.0	30	01	17	72.0	35	00	20	83.7	40	00	22
20.6	15	06	09	34.4	20	05	12	47.8	25	04	14	60.1	30	02	17	72.1	35	01	20	83.9	40	00	22
20.7	16	00	09	34.7	20	05	12	48.1	25	04	14	60.3	30	02	17	72.4	35	01	20	84.0	40	01	22
21.0	16	00	09	34.8	20	06	12	48.2	25	05	14	60.4	30	03	17	72.5	35	02	20	84.2	40	01	22
21.1	16	01	09	35.1	20	06	12	48.4	25	05	14	60.7	30	03	17	72.7	35	02	20	84.3	40	02	22
21.5	16	01	09	35.2	21	00	12	48.5	25	06	14	60.8	30	04	17	72.8	35	03	20	84.5	40	02	22
21.6	16	02	09	35.5	21	00	12	48.8	25	06	14	61.1	30	04	17	73.1	35	03	20	84.6	40	02	23
21.9	16	02	09	35.6	21	01	12	48.9	26	00	14	61.2	30	05	17	73.2	35	04	20	84.7	40	03	23
22.0	16	03	09	35.9	21	01	12	49.0	26	00	14	61.4	30	05	17	73.4	35	04	20	84.9	40	03	23
22.3	16	03	09	36.0	21	02	12	49.1	26	00	15	61.5	30	06	17	73.5	35	05	20	85.0	40	04	23
22.4	16	04	09	36.3	21	02	12	49.2	26	00	15	61.8	30	06	17	73.8	35	05	20	85.2	40	04	23
22.6	16	04	09	36.4	21	03	12	49.3	26	01	15	61.9	31	00	17	73.9	35	06	20	85.3	40	05	23
22.7	16	04	09	36.7	21	03	12	49.6	26	01	15	62.1	31	00	17	74.1	35	06	20	85.5	40	05	23
22.8	16	05	09	36.8	21	04	12	49.7	26	02	15	62.2	31	01	17	74.2	36	00	20	85.6	40	06	23
23.2	16	05	09	37.1	21	04	12	50.0	26	02	15	62.5	31	01	17	74.4	36	00	20	85.9	40	06	23
23.3	16	06	09	37.2	21	05	12	50.1	26	03	15	62.6	31	02	17	74.5	36	01	20	86.0	41	00	23
23.6	16	06	09	37.5	21	05	12	50.3	26	03	15	62.9	31	02	17	74.8	36	01	20				
23.7	17	00	09	37.6	21	06	12	50.4	26	04	15	63.0	31	03	18	74.9	36	02	20				
23.9	17	00	09	37.9	21	06	12	50.7	26	04	15	63.2	31	03	18	75.1	36	02	20				
24.0	17	00	10	38.0	22	00	12	50.8	26	05	15	63.3	31	04	18	75.2	36	03	20				

Growth Analysis Ratios and Indexes

Head Circumference/Abdominal Circumference Ratio, Campbell

Campbell S, Thoms A. "Ultrasound measurement of the fetal head to abdomen circumference ratio in the assessment of growth retardation." *British Journal of Obstetrics and Gynaecology*, 84:165, 1977.

HC/AC Ratio = HC/AC
5th and 95th percentile

MA (weeks)	-2SD	Mean	+2SD
13-14 wk	1.12	1.23	1.33
15-16 wk	1.01	1.22	1.43
17-18 wk	1.05	1.18	1.31
19-20 wk	1.07	1.18	1.28
21-22 wk	1.04	1.15	1.27
23-24 wk	1.03	1.13	1.23
25-26 wk	1.02	1.13	1.24
27-28 wk	1.03	1.13	1.24

MA (weeks)	-2SD	Mean	+2SD
29-30 wk	0.97	1.10	1.23
31-32 wk	0.94	1.07	1.19
33-34 wk	0.94	1.04	1.13
35-36 wk	0.91	1.02	1.13
37-38 wk	0.91	0.98	1.07
39-40 wk	0.85	0.97	1.08
41-42 wk	0.92	0.96	1.00

Femur Length/Abdominal Circumference Ratio, Hadlock

Hadlock FP, Deter RL, Harrist RB, Roecker E, Park SK. "A Date-Independent Predictor of Intrauterine Growth Retardation: Femur Length/Abdominal Circumference Ratio." *American Journal of Roentgenology* 141: 979, 1983.

Valid for 21 to 42 weeks
FL/AC Ratio = FL/AC * 100
Mean = 22
±2 Standard Deviations = 2

Femur Length/Biparietal Diameter Ratio, Hohler

Hohler CW, Quetel TA. "Comparison of ultrasound femur length and biparietal diameter in late pregnancy." *American Journal of Obstetrics and Gynecology* 141(7):759, 1981.

Valid for 23 to 40 weeks
FL/BPD Ratio = FL/BPD * 100
Mean = (mean of FL)/(mean of BPD) * 100
Norm of the ratio = (0.002 * MA(wks) + 0.73) * 100)
±1 Standard Deviation = 0.05
±2 Standard Deviation = 0.10

Cephalic Index, Hadlock

Hadlock FP, Deter RL, Carpenter RJ, Park SK. "Estimating Fetal Age: Effect of Head Shape on BPD." *American Journal of Roentgenology* 137:83, 1981.

Valid for 14 to 40 weeks
CI = short axis/long axis * 100
Mean = 78.3
±1 Standard Deviation = 74-83
±2 Standard Deviations = 70-86

Cephalic Index, Chitty

Chitty, LS, Altman, DG, "Charts of Fetal Size: 2. Head Measurements," *British Journal of Obstetrics & Gynaecology* 101:35-43, 1994.

CI Days	5%	mean	95%	CI Days	5%	mean	95%	CI Days	5%	mean	95%	CI Days	5%	mean	95%	CI Days	5%	mean	95%
84	75.5	81.5	87.6	127	73.3	79.3	85.3	170	72.2	78.2	84.3	213	72.2	78.3	84.3	256	73.5	79.5	85.5
85	75.4	81.5	87.5	128	73.2	79.3	85.3	171	72.2	78.2	84.2	214	72.3	78.3	84.3	257	73.5	79.5	85.6
86	75.4	81.4	87.5	129	73.2	79.2	85.3	172	72.1	78.2	84.2	215	72.3	78.3	84.4	258	73.5	79.6	85.6
87	75.3	81.4	87.4	130	73.1	79.2	85.2	173	72.1	78.2	84.2	216	72.3	78.3	84.4	259	73.6	79.6	85.7
88	75.2	81.3	87.3	131	73.1	79.2	85.2	174	72.1	78.2	84.2	217	72.3	78.3	84.4	260	73.6	79.7	85.7
89	75.2	81.2	87.3	132	73.1	79.1	85.2	175	72.1	78.2	84.2	218	72.3	78.4	84.4	261	73.7	79.7	85.8
90	75.1	81.2	87.2	133	73.0	79.1	85.1	176	72.1	78.2	84.2	219	72.3	78.4	84.4	262	73.7	79.8	85.8
91	75.1	81.1	87.1	134	73.0	79.0	85.1	177	72.1	78.1	84.2	220	72.4	78.4	84.4	263	73.8	79.8	85.9
92	75.0	81.0	87.1	135	73.0	79.0	85.1	178	72.1	78.1	84.2	221	72.4	78.4	84.5	264	73.8	79.9	85.9
93	74.9	81.0	87.0	136	72.9	79.0	85.0	179	72.1	78.1	84.2	222	72.4	78.4	84.5	265	73.9	79.9	86.0
94	74.9	80.9	87.0	137	72.9	78.9	85.0	180	72.1	78.1	84.2	223	72.4	78.5	84.5	266	73.9	80.0	86.0
95	74.8	80.9	86.9	138	72.9	78.9	85.0	181	72.1	78.1	84.2	224	72.4	78.5	84.5	267	74.0	80.0	86.0
96	74.8	80.8	86.8	139	72.8	78.9	84.9	182	72.1	78.1	84.2	225	72.5	78.5	84.5	268	74.0	80.1	86.1
97	74.7	80.7	86.8	140	72.8	78.9	84.9	183	72.1	78.1	84.2	226	72.5	78.5	84.6	269	74.1	80.1	86.1
98	74.6	80.7	86.7	141	72.8	78.8	84.9	184	72.1	78.1	84.2	227	72.5	78.6	84.6	270	74.1	80.2	86.2
99	74.6	80.6	86.7	142	72.7	78.8	84.8	185	72.1	78.1	84.1	228	72.5	78.6	84.6	271	74.2	80.2	86.2
100	74.5	80.6	86.6	143	72.7	78.8	84.8	186	72.1	78.1	84.1	229	72.6	78.6	84.6	272	74.2	80.3	86.3
101	74.5	80.5	86.6	144	72.7	78.7	84.8	187	72.1	78.1	84.1	230	72.6	78.6	84.7	273	74.3	80.3	86.4
102	74.4	80.5	86.5	145	72.7	78.7	84.7	188	72.1	78.1	84.1	231	72.6	78.7	84.7	274	74.3	80.4	86.4
103	74.4	80.4	86.5	146	72.6	78.7	84.7	189	72.1	78.1	84.1	232	72.6	78.7	84.7	275	74.4	80.4	86.5
104	74.3	80.4	86.4	147	72.6	78.7	84.7	190	72.1	78.1	84.1	233	72.7	78.7	84.7	276	74.4	80.5	86.5
105	74.3	80.3	86.3	148	72.6	78.6	84.7	191	72.1	78.1	84.1	234	72.7	78.7	84.8	277	74.5	80.5	86.6
106	74.2	80.3	86.3	149	72.6	78.6	84.6	192	72.1	78.1	84.1	235	72.7	78.8	84.8	278	74.5	80.6	86.6
107	74.2	80.2	86.2	150	72.5	78.6	84.6	193	72.1	78.1	84.1	236	72.8	78.8	84.8	279	74.6	80.6	86.7
108	74.1	80.2	86.2	151	72.5	78.6	84.6	194	72.1	78.1	84.2	237	72.8	78.8	84.9	280	74.7	80.7	86.7
109	74.1	80.1	86.1	152	72.5	78.5	84.6	195	72.1	78.1	84.2	238	72.8	78.9	84.9	281	74.7	80.8	86.8
110	74.0	80.1	86.1	153	72.5	78.5	84.5	196	72.1	78.1	84.2	239	72.8	78.9	84.9	282	74.8	80.8	86.9
111	74.0	80.0	86.0	154	72.4	78.5	84.5	197	72.1	78.1	84.2	240	72.9	78.9	85.0	283	74.8	80.9	86.9
112	73.9	80.0	86.0	155	72.4	78.5	84.5	198	72.1	78.1	84.2	241	72.9	78.9	85.0	284	74.9	80.9	87.0
113	73.9	79.9	85.9	156	72.4	78.4	84.5	199	72.1	78.1	84.2	242	72.9	79.0	85.0	285	74.9	81.0	87.0
114	73.8	79.9	85.9	157	72.4	78.4	84.5	200	72.1	78.1	84.2	243	73.0	79.0	85.1	286	75.0	81.0	87.1
115	73.8	79.8	85.9	158	72.4	78.4	84.4	201	72.1	78.1	84.2	244	73.0	79.0	85.1	287	75.1	81.1	87.2
116	73.7	79.8	85.8	159	72.3	78.4	84.4	202	72.1	78.2	84.2	245	73.0	79.1	85.1	288	75.1	81.2	87.2
117	73.7	79.7	85.8	160	72.3	78.4	84.4	203	72.1	78.2	84.2	246	73.1	79.1	85.2	289	75.2	81.2	87.3
118	73.6	79.7	85.7	161	72.3	78.3	84.4	204	72.1	78.2	84.2	247	73.1	79.2	85.2	290	75.3	81.3	87.3
119	73.6	79.6	85.7	162	72.3	78.3	84.4	205	72.1	78.2	84.2	248	73.1	79.2	85.2	291	75.3	81.4	87.4
120	73.5	79.6	85.6	163	72.3	78.3	84.4	206	72.1	78.2	84.2	249	73.2	79.2	85.3	292	75.4	81.4	87.5
121	73.5	79.5	85.6	164	72.3	78.3	84.3	207	72.2	78.2	84.2	250	73.2	79.3	85.3	293	75.4	81.5	87.5
122	73.5	79.5	85.5	165	72.2	78.3	84.3	208	72.2	78.2	84.3	251	73.3	79.3	85.3	294	75.5	81.6	87.6
123	73.4	79.5	85.5	166	72.2	78.3	84.3	209	72.2	78.2	84.3	252	73.3	79.3	85.4				
124	73.4	79.4	85.5	167	72.2	78.3	84.3	210	72.2	78.2	84.3	253	73.3	79.4	85.4				
125	73.3	79.4	85.4	168	72.2	78.2	84.3	211	72.2	78.3	84.3	254	73.4	79.4	85.5				
126	73.3	79.3	85.4	169	72.2	78.2	84.3	212	72.2	78.3	84.3	255	73.4	79.5	85.5				

Fetal Weight Estimation, Hadlock

Hadlock FP, Harrist RB, Sharman RS, Deter RL, Park SK. "Estimation of fetal weight with the use of head, body, and femur measurements—A prospective study." *American Journal of Obstetrics and Gynecology* 151:333, 1985.

1Hadlock

Valid for EFW US MA display 20 to 42 weeks

EFWgm(ACcm,FLcm) = 10^(1.304 + 0.05281 * AC + 0.1938 * FL - 0.004 * AC * FL)

± 2 Standard Deviations = 16.0%

2Hadlock

Valid for EFW US MA display 20 to 42 weeks

EFWgm(BPDcm, ACcm, FLcm) = 10^(1.335 - 0.0034 * AC * FL + 0.0316 * BPD + 0.0457 * AC + 0.1623 * FL)

± 2 Standard Deviations = 15.0%

3Hadlock

Valid for EFW US MA display 20 to 42 weeks

EFWgm(HCcm, ACcm, FLcm) =
10^(1.326 - 0.00326 * AC * FL + 0.0107 * HC + 0.0438 * AC + 0.158 * FL)

± 2 Standard Deviations = 15.0%

4Hadlock

Valid for EFW US MA display 20 to 42 weeks

EFWgm(BPDcm, HCcm, ACcm, FLcm)=
10^(1.3596 - 0.00386 * AC * FL + 0.0064 *HC + 0.00061 * BPD * AC + 0.0424 * AC + 0.174 * FL)

±1 Standard Deviation = 7.4%

±2 Standard Deviations = 14.8%

Fetal Weight Estimation, Shepard

Shepard MJ, Richards VA, Berkowitz RL, Warsof SL, Hobbins JC. "An evaluation of two equations for predicting fetal weight by ultrasound." *American Journal of Obstetrics and Gynecology.* 142(1):47, 1982.

Valid for BPD 31 to 100 mm and AC 155 to 400 mm
EFWKg(BPDcm, ACcm) = 10^(-1.7492 + 0.166 * BPD + 0.046 * AC - 2.646 * (AC * BPD)/1000)
±2 SD = ±212.0 gms per Kg of EFW
±1 SD = ±106.0 gms per Kg of EFW

Fetal Weight Estimation, Schuhmacher

Hansmann M, Hackelöer B-J, Staudach A. *Ultrasound Diagnosis in Obstetrics and Gynecology.* New York: Springer-Verlag, 1986.

Valid: 45 ≤ TAD ≤ 150 mm 66 ≤ BPD ≤ 110 mm 30 ≤ MA ≤ 44 weeks
W(g) =
$-0.001665958 * TAD(mm)^3 + 0.4133629 * TAD(mm)^2 - 0.5580294 * TAD(mm) - 0.01231535 * BPD(mm)^3 + 3.702 * BPD(mm)^2 - 330.1811 * BPD(mm) - 0.4937199 * MA(wks)^3 + 55.958061 * MA(wks)^2 - 2034.3901 * MA(wks) + 32768.19$
± 3,2,1 Standard Deviations for MA: 29 – 41 wks

Fetal Weight Estimation, Hansmann

Hansmann M, Hackelöer B-J, Staudach A. *Ultrasound Diagnosis in Obstetrics and Gynecology.* New York: Springer-Verlag, 1986.

W(g) =
$0.515263 - (0.105775*BPD) + (0.000930707 * [BPD]^2) + (0.0649145*TAD) – (0.00020562 * TAD[mm]^2)$
± 2 Standard Deviations

Fetal Weight Estimation, Merz

Merz E. *Ultrasound in Gynecology and Obstetrics.* Stuttgart and New York: Thieme Medical Publishers, Inc., 1991, p. 157.

Valid: 70.0 mm ≤ BPD ≤ 105.0 mm; 218.0 cm ≤ AC ≤ 365.0 cm 28 weeks 1 day ≤ MA ≤ 42 weeks
W(g) =
$-03200.40479 + 157.07186 * AC + 15.90391 * BPD^2$

Menstrual Age by Ultrasound and Estimated Date of Confinement

CLINICAL MA - Clinical Menstrual Age

Source data for Clinical MA is determined by the user during the Patient ID operation calculated weeks and days since LMP.

US MA - Composite Menstrual Age Estimation by Ultrasound

Simple Average - US MA(ave)

The sum of all menstrual ages determined by single parameter tables/formulas, divided by the number of parameters summed.

Regression Equations, Hadlock

Hadlock FP, Deter RL, Harrist RB, Park SK. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters." *Radiology* 152:497, 1984.

US MA wks(BPDcm, ACcm) = $9.57 + 0.524 * AC + 0.1220 * BPD^2$
US MA wks(BPDcm, HCcm) = $10.32 + 0.009 * HC^2 + 1.3200 * BPD + 0.00012 * HC^3$
US MA wks(BPDcm, FLcm) = 10.5 + 0.197 * BPD * FL + 0.9500 * FL + 0.7300 * BPD
US MA wks(HCcm, ACcm) = $10.31 + 0.012 * HC^2 + 0.3850 * AC$
US MA wks(HCcm, FLcm) = 11.19 + 0.070 HC * FL + 0.2630 * HC
US MA wks(ACcm, FLcm) = $10.47 + 0.442 * AC + 0.3140 * FL^2 - 0.0121 FL^3$
US MA wks(BPDcm, ACcm, FLcm) = 10.61 + 0.175 * BPD * FL + 0.2970 * AC + 0.7100 * FL
US MA wks(HCcm, BPDcm, FLcm) = 11.38 + 0.70 * HC * FL + 0.9800 * BPD
US MA wks(HCcm, ACcm, FLcm) = 10.33 + 0.031 * HC * FL + 0.3610 * HC + 0.0298 * AC * FL
US MA wks(HCcm, ACcm, BPDcm) = $10.58 + 0.005 HC^2 + 0.3635 * AC + 0.02864 * BPD * AC$
US MA wks(BPDcm, HCcm, ACcm, FLcm) = 10.85 + 0.060 * HC * FL + 0.6700 * BPD + 0.1680 * AC

CLINICAL EDC - Estimated Date of Confinement by Last Menstrual Period

280 days added to date of LMP date.

US EDC Estimated Date of Confinement by Ultrasound

280 days - today's US MA (in days), add to today's date = US EDC

Parameters for Growth Analysis Graphs

The references in this section are used to analyze fetal growth by plotting a measured parameter against clinical menstrual age. The plotted points are displayed on a graph that indicates the 5%, 50%, and 95% for an expected parameter measurement determined by a function using menstrual age.

Mean Gestational Sac Diameter, Rempen

Rempen A. "Biometrie in der Frühgravidität (I. Trimenon) (Biometry in Early Pregnancy (1st Trimester))." *Der Frauenarzt* 32:425, 1991.

5 & 95%: ±10.5 mm

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
4	4	0	.5	11.0	6	3	6.6	17.1	27.6	8	2	21.1	31.6	42.1	10	1	33.5	44.0	54.5	12	0	43.8	54.3	64.8
4	5	0	1.8	12.3	6	4	7.8	18.3	28.8	8	3	22.1	32.6	43.1	10	2	34.4	44.9	55.4	12	1	44.6	55.1	65.6
4	6	0	3.2	13.7	6	5	8.9	19.4	29.9	8	4	23.1	33.6	44.1	10	3	35.2	45.7	56.2	12	2	45.3	55.8	66.3
5	0	0	4.5	15.0	6	6	10.1	20.6	31.1	8	5	24.1	34.6	45.1	10	4	36.1	46.6	57.1	12	3	45.9	56.4	66.9
5	1	0	5.8	16.3	7	0	11.2	21.7	32.2	8	6	25.1	35.6	46.1	10	5	36.9	47.4	57.9	12	4	46.6	57.1	67.6
5	2	0	7.1	17.6	7	1	12.4	22.9	33.4	9	0	26.1	36.6	47.1	10	6	37.7	48.2	58.7	12	5	47.3	57.8	68.3
5	3	0	8.4	18.9	7	2	13.5	24.0	34.5	9	1	27.1	37.6	48.1	11	0	38.5	49.0	59.5	12	6	47.9	58.4	68.9
5	4	0	9.7	20.2	7	3	14.6	25.1	35.6	9	2	28.0	38.5	49.0	11	1	39.3	49.8	60.3	13	0	48.6	59.1	69.6
5	5	0.4	10.9	21.4	7	4	15.7	26.2	36.7	9	3	29.0	39.5	50.0	11	2	40.1	50.6	61.1	13	1	49.2	59.7	70.2
5	6	1.7	12.2	22.7	7	5	16.8	27.3	37.8	9	4	29.9	40.4	50.9	11	3	40.9	51.4	61.9	13	2	49.8	60.3	70.8
6	0	2.9	13.4	23.9	7	6	17.9	28.4	38.9	9	5	30.8	41.3	51.8	11	4	41.6	52.1	62.6					
6	1	4.1	14.6	25.1	8	0	19.0	29.5	40.0	9	6	31.7	42.2	52.7	11	5	42.4	52.9	63.4					
6	2	5.4	15.9	26.4	8	1	20.0	30.5	41.0	10	0	32.6	43.1	53.6	11	6	43.1	53.6	64.1					

Gestational Sac, Tokyo

Masuda H, Shinozuka N, Okai T, Mizuno M. "Diagnosis of the Week of Pregnancy and Prognosis." *Perinatal Care* 8:719-726.

GS Days	- 1.5SD	mean mm	+ 1.5SD	GS Days	- 1.5SD	mean mm	+ 1.5SD	GS Days	- 1.5SD	mean mm	+ 1.5SD	GS Days	- 1.5SD	mean mm	+ 1.5SD	GS Days	- 1.5SD	mean mm	+ 1.5SD
28	6.4	10.0	16.3	40	13.5	19.4	27.9	52	21.4	29.6	41.4	64	30.2	41.6	56.7	76	40.0	55.6	76.3
29	7.0	10.8	17.4	41	14.1	20.2	28.9	53	22.1	30.5	42.7	65	31.0	42.7	58.0	77	40.9	56.9	78.6
30	7.6	11.6	18.3	42	14.7	21.0	30.0	54	22.8	31.5	43.9	66	31.8	43.8	59.4	78	41.8	58.2	81.0
31	8.1	12.4	19.3	43	15.3	21.8	31.1	55	23.5	32.4	45.1	67	32.6	44.9	60.8	79	42.8	59.6	83.6
32	8.7	13.2	20.2	44	16.0	22.6	32.1	56	24.2	33.4	46.4	68	33.3	46.0	62.3	80	43.8	61.0	86.4
33	9.3	14.0	21.2	45	16.6	23.4	33.3	57	25.0	34.4	47.6	69	34.1	47.1	63.8	81	44.8	62.4	89.4
34	9.9	14.8	22.1	46	17.3	24.3	34.4	58	25.7	35.4	48.9	70	34.9	48.3	65.3	82	45.8	63.9	92.6
35	10.5	15.5	23.0	47	17.9	25.1	35.5	59	26.5	36.4	50.2	71	35.8	49.5	66.9	83	46.9	65.4	96.1
36	11.0	16.3	24.0	48	18.6	26.0	36.7	60	27.2	37.4	51.4	72	36.6	50.6	68.6	84	48.0	67.0	100.0
37	11.6	17.1	25.0	49	19.3	26.9	37.8	61	27.9	38.4	52.7	73	37.4	51.9	70.4				
38	12.2	17.8	25.9	50	20.0	27.8	39.0	62	28.7	39.5	54.0	74	38.3	53.1	72.3				
39	12.8	18.6	26.9	51	20.7	28.7	40.2	63	29.5	40.5	55.3	75	39.1	54.3	74.2				

Crown Rump Length, Hadlock

Hadlock FP, Shah YP, Kanon DJ, Lindsey JV. "Fetal Crown-Rump Length: Reevaluation of Relation to Menstrual Age (5-18 weeks) with High-Resolution Real-Time US." *Radiology* 182(2):501, 1992.

$LN(CRLcm) = -6.983 + 1.4498 * MA(wks) - 0.078345 * MA^2 + 0.001501 * MA^3$

5 & 95%: 0.217 cm * CRL   1 SD: 0.132cm * CRL

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
4	6	2.0	1.6	2.4	7	4	11.7	9.1	14.2	10	2	35.8	28.0	43.5	13	0	68.3	53.5	83.2	15	5	97.5	76.4	118.7
5	0	2.2	1.7	2.7	7	5	12.6	9.8	15.3	10	3	37.4	29.3	45.5	13	1	70.0	54.8	85.2	15	6	98.9	77.5	120.4
5	1	2.5	1.9	3.0	7	6	13.5	10.6	16.4	10	4	39.0	30.5	47.5	13	2	71.7	56.1	87.3	16	0	100.3	78.5	122.1
5	2	2.8	2.2	3.4	8	0	14.5	11.3	17.6	10	5	40.7	31.8	49.5	13	3	73.4	57.4	89.3	16	1	101.7	79.6	123.7
5	3	3.1	2.4	3.7	8	1	15.5	12.1	18.9	10	6	42.4	33.2	51.5	13	4	75.0	58.7	91.3	16	2	103.0	80.7	125.4
5	4	3.4	2.7	4.1	8	2	16.6	13.0	20.2	11	0	44.1	34.5	53.6	13	5	76.6	60.0	93.3	16	3	104.4	81.7	127.0
5	5	3.8	2.9	4.6	8	3	17.7	13.8	21.5	11	1	45.8	35.8	55.7	13	6	78.2	61.3	95.2	16	4	105.7	82.8	128.7
5	6	4.2	3.3	5.1	8	4	18.8	14.7	22.9	11	2	47.5	37.2	57.8	14	0	79.8	62.5	97.2	16	5	107.1	83.9	130.3
6	0	4.6	3.6	5.6	8	5	20.0	15.7	24.4	11	3	49.2	38.5	59.9	14	1	81.4	63.7	99.1	16	6	108.5	84.9	132.0
6	1	5.0	3.9	6.1	8	6	21.3	16.7	25.9	11	4	51.0	39.9	62.0	14	2	83.0	65.0	101.0	17	0	109.8	86.0	133.7
6	2	5.5	4.3	6.7	9	0	22.6	17.7	27.5	11	5	52.7	41.3	64.2	14	3	84.5	66.2	102.8	17	1	111.2	87.1	135.3
6	3	6.1	4.7	7.4	9	1	23.9	18.7	29.1	11	6	54.5	42.6	66.3	14	4	86.0	67.3	104.7	17	2	112.6	88.2	137.0
6	4	6.6	5.2	8.1	9	2	25.2	19.8	30.7	12	0	56.2	44.0	68.4	14	5	87.5	68.5	106.5	17	3	114.0	89.3	138.7
6	5	7.2	5.7	8.8	9	3	26.6	20.9	32.4	12	1	58.0	45.4	70.5	14	6	89.0	69.7	108.3	17	4	115.4	90.4	140.5
6	6	7.9	6.2	9.6	9	4	28.1	22.0	34.2	12	2	59.7	46.8	72.7	15	0	90.5	70.8	110.1	17	5	116.9	91.5	142.2
7	0	8.5	6.7	10.4	9	5	29.6	23.1	36.0	12	3	61.5	48.1	74.8	15	1	91.9	72.0	111.8	17	6	118.3	92.7	144.0
7	1	9.3	7.2	11.3	9	6	31.1	24.3	37.8	12	4	63.2	49.5	76.9	15	2	93.3	73.1	113.6	18	0	119.8	93.8	145.8
7	2	10.0	7.8	12.2	10	0	32.6	25.5	39.7	12	5	64.9	50.8	79.0	15	3	94.7	74.2	115.3					
7	3	10.8	8.5	13.2	10	1	34.2	26.7	41.6	12	6	66.6	52.2	81.1	15	4	96.2	75.3	117.0					

Crown Rump Length, Rempen

Rempen A. "Biometrie in der Frühgravidität (I. Trimenon) (Biometry in Early Pregnancy (1st Trimester))." *Der Frauenarzt* 32:425, 1991, p. 427.

5 & 95%: ±7.8 mm

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
5	5	0	1.2	9.0	7	2	3.7	11.5	19.3	8	6	15.7	23.5	31.3	10	3	29.4	37.2	45.0	12	0	44.9	52.7	60.5
5	6	0	2.1	9.9	7	3	4.7	12.5	20.3	9	0	16.8	24.6	32.4	10	4	30.7	38.5	46.3	12	1	46.4	54.2	62.0
6	0	0	3.0	10.8	7	4	5.7	13.5	21.3	9	1	18.0	25.8	33.6	10	5	32.1	39.9	47.7	12	2	47.9	55.7	63.5
6	1	0	3.8	11.6	7	5	6.8	14.6	22.4	9	2	19.2	27.0	34.8	10	6	33.5	41.3	49.1	12	3	49.5	57.3	65.1
6	2	0	4.7	12.5	7	6	7.8	15.6	23.4	9	3	20.5	28.3	36.1	11	0	34.8	42.6	50.4	12	4	51.0	58.8	66.6
6	3	0	5.7	13.5	8	0	8.9	16.7	24.5	9	4	21.7	29.5	37.3	11	1	36.2	44.0	51.8	12	5	52.5	60.3	68.1
6	4	0	6.6	14.4	8	1	10.0	17.8	25.6	9	5	22.9	30.7	38.5	11	2	37.6	45.4	53.2	12	6	54.1	61.9	69.7
6	5	0	7.5	15.3	8	2	11.1	18.9	26.7	9	6	24.2	32.0	39.8	11	3	39.1	46.9	54.7	13	0	55.7	63.5	71.3
6	6	0.7	8.5	16.3	8	3	12.2	20.0	27.8	10	0	25.5	33.3	41.1	11	4	40.5	48.3	56.1	13	1	57.3	65.1	72.9
7	0	1.7	9.5	17.3	8	4	13.3	21.1	28.9	10	1	26.8	34.6	42.4	11	5	42.0	49.8	57.6	13	2	58.9	66.7	74.5
7	1	2.7	10.5	18.3	8	5	14.5	22.3	30.1	10	2	28.1	35.9	43.7	11	6	43.4	51.2	59.0					

Crown Rump Length, Robinson

Robinson HP and Fleming JEE. "A critical evaluation of sonar 'crown-rump length' measurements." *British Journal of Obstetrics and Gynaecology* 82:702, 1975.

CRL(mm)=0.0144 * MA(days)^2 - 0.6444 * MA + 7.295 5 & 95%: (2SD/2*1.645)

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
6	2	6.8	4.4	9.3	7	6	15.4	11.7	19.1	9	3	27.5	22.5	32.5	11	0	43.1	36.8	49.3	12	4	62.1	54.6	69.6
6	3	7.5	4.9	10.0	8	0	16.4	12.6	20.2	9	4	28.8	23.7	33.8	11	1	44.6	38.3	51.0	12	5	64.0	56.4	71.6
6	4	8.1	5.5	10.8	8	1	17.3	13.4	21.3	9	5	30.1	24.9	35.3	11	2	46.3	39.8	52.7	12	6	65.9	58.2	73.7
6	5	8.8	6.0	11.6	8	2	18.4	14.3	22.4	9	6	31.4	26.1	36.7	11	3	47.9	41.3	54.5	13	0	67.9	60.1	75.7
6	6	9.5	6.6	12.4	8	3	19.4	15.2	23.6	10	0	32.7	27.3	38.2	11	4	49.6	42.9	56.3	13	1	69.9	61.9	77.9
7	0	10.3	7.3	13.3	8	4	20.5	16.2	24.7	10	1	34.1	28.6	39.7	11	5	51.3	44.5	58.1	13	2	71.9	63.8	80.0
7	1	11.1	7.9	14.2	8	5	21.6	17.2	26.0	10	2	35.5	29.9	41.2	11	6	53.0	46.1	59.9	13	3	74.0	65.8	82.2
7	2	11.9	8.6	15.1	8	6	22.7	18.2	27.2	10	3	37.0	31.2	42.8	12	0	54.8	47.7	61.8	13	4	76.0	67.7	84.3
7	3	12.7	9.4	16.1	9	0	23.9	19.2	28.5	10	4	38.5	32.6	44.4	12	1	56.6	49.4	63.7	13	5	78.1	69.7	86.6
7	4	13.6	10.1	17.1	9	1	25.0	20.3	29.8	10	5	40.0	34.0	46.0	12	2	58.4	51.1	65.6	13	6	80.3	71.7	88.8
7	5	14.5	10.9	18.1	9	2	26.2	21.4	31.1	10	6	41.5	35.4	47.6	12	3	60.2	52.8	67.6	14	0	82.4	73.8	91.1

Crown Rump Length, Hansmann

Hansmann M, Hackelöer B-J, Staudach A. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, 1985.

5 & 95%: (2SD/2*1.645)

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
6	1	3.1	6.9	10.7	9	0	13.4	21.5	29.5	11	6	37.9	50.2	62.5	14	5	70.7	87.2	103.6	17	4	94.4	115.1	135.9
6	2	3.7	7.6	11.6	9	1	14.3	22.6	30.8	12	0	39.6	52.0	64.5	14	6	72.2	88.9	105.6	17	5	95.2	116.2	137.2
6	3	4.1	8.3	12.5	9	2	15.1	23.6	32.1	12	1	41.1	53.8	66.5	15	0	73.7	90.6	107.5	17	6	96.1	117.2	138.3
6	4	4.6	9.0	13.4	9	3	16.1	24.8	33.4	12	2	42.8	55.6	68.5	15	1	75.1	92.2	109.4	18	0	96.8	118.1	139.5
6	5	4.9	9.6	14.2	9	4	17.0	25.9	34.7	12	3	44.4	57.5	70.6	15	2	76.5	93.9	111.3	18	1	97.5	119.1	140.6
6	6	5.3	10.2	15.1	9	5	18.1	27.1	36.1	12	4	46.1	59.4	72.6	15	3	78.0	95.5	113.1	18	2	98.2	120.0	141.8
7	0	5.8	10.8	15.8	9	6	19.0	28.3	37.6	12	5	47.7	61.3	74.8	15	4	79.3	97.1	114.9	18	3	98.9	121.0	143.0
7	1	6.1	11.4	16.7	10	0	20.2	29.7	39.2	12	6	49.4	63.1	76.8	15	5	80.7	98.6	116.6	18	4	99.6	121.9	144.1
7	2	6.6	12.1	17.5	10	1	21.3	31.0	40.7	13	0	51.0	65.0	79.0	15	6	81.9	100.1	118.3	18	5	100.3	122.8	145.3
7	3	7.0	12.7	18.4	10	2	22.4	32.4	42.3	13	1	52.8	66.9	81.0	16	0	83.2	101.5	119.9	18	6	101.1	123.7	146.3
7	4	7.5	13.3	19.2	10	3	23.7	33.9	44.0	13	2	54.4	68.8	83.2	16	1	84.3	103.0	121.6	19	0	101.8	124.6	147.5
7	5	7.9	14.0	20.1	10	4	24.9	35.3	45.7	13	3	56.6	70.7	85.3	16	2	85.6	104.4	123.2	19	1	102.5	125.5	148.6
7	6	8.4	14.7	21.0	10	5	26.3	36.8	47.4	13	4	58.6	72.6	87.4	16	3	86.7	105.7	124.8	19	2	103.2	126.5	149.8
8	0	8.9	15.4	22.0	10	6	27.5	38.3	49.1	13	5	59.9	74.5	89.5	16	4	87.8	107.0	126.2	19	3	104.0	127.4	150.9
8	1	9.5	16.2	22.9	11	0	29.0	39.9	50.9	13	6	61.1	76.3	91.5	16	5	88.8	108.3	127.7	19	4	104.7	128.4	152.2
8	2	10.1	17.0	24.0	11	1	30.3	41.6	52.8	14	0	62.7	78.1	93.6	16	6	89.8	109.5	129.2	19	5	105.5	129.4	153.3
8	3	10.6	17.8	25.0	11	2	31.8	43.2	54.6	14	1	64.3	80.0	95.6	17	0	90.8	110.7	130.5	19	6	106.4	130.5	154.7
8	4	11.3	18.7	26.1	11	3	33.3	44.9	56.7	14	2	65.9	81.8	97.7	17	1	91.7	111.8	132.0	20	0	107.3	131.6	155.9
8	5	12.0	19.6	27.2	11	4	34.8	46.6	58.7	14	3	67.6	83.6	99.7	17	2	92.7	113.0	133.3	20	1	108.2	132.8	157.3
8	6	12.7	20.6	28.3	11	5	36.4	48.4	60.6	14	4	69.1	85.4	101.7	17	3	93.5	114.1	134.7	20	2	109.3	134.0	158.8

Crown Rump Length, Tokyo

Masuda H, Shinozuka N, Okai T, Mizuno M. "Diagnosis of the Week of Pregnancy and Prognosis." *Perinatal Care* 8:719-726.

CRL Days	- 1.5SD	mean mm	+ 1.5SD	CRL Days	- 1.5SD	mean mm	+ 1.5SD	CRL Days	- 1.5SD	mean mm	+ 1.5SD	CRL Days	- 1.5SD	mean mm	+ 1.5SD	CRL Days	- 1.5SD	mean mm	+ 1.5SD
56	10.0	15.1	19.5	66	16.6	22.9	28.9	76	26.8	35.6	42.6	86	39.4	49.7	59.8	96	55.1	67.0	82.6
57	10.3	15.3	20.1	67	17.5	24.1	30.2	77	28.0	37.0	44.2	87	40.8	51.2	61.9	97	56.8	69.0	85.2
58	10.7	15.8	20.7	68	18.5	25.3	31.4	78	29.1	38.3	45.7	88	42.3	52.8	63.9	98	58.6	71.0	87.8
59	11.3	16.3	21.5	69	19.5	26.5	32.8	79	30.3	39.7	47.3	89	43.8	54.4	66.0	99	60.3	73.1	90.4
60	11.9	17.0	22.4	70	20.5	27.8	34.1	80	31.5	41.1	49.0	90	45.3	56.1	68.2	100	62.0	75.3	93.0
61	12.5	17.8	23.3	71	21.5	29.1	35.5	81	32.7	42.4	50.7	91	46.9	57.7	70.5	101	63.7	77.6	95.7
62	13.3	18.7	24.3	72	22.5	30.4	36.8	82	34.0	43.9	52.4	92	48.5	59.5	72.8	102	65.3	79.8	98.3
63	14.0	19.7	25.4	73	23.6	31.7	38.2	83	35.3	45.3	54.2	93	50.1	61.3	75.2	103	66.9	82.2	100.9
64	14.9	20.7	26.5	74	24.6	33.0	39.7	84	36.6	46.7	56.0	94	51.8	63.1	77.6	104	68.5	84.6	103.5
65	15.7	21.8	27.7	75	25.7	34.3	41.1	85	38.0	48.2	57.9	95	53.4	65.0	80.1	105	70.0	87.0	106.0

Crown Rump Length, Osaka

Aoki M, Yamada M. "Examining Fetal Growth." *Obstetrics and Gynecology* 47:547-556, 1983.

CRL Days	- 1.5SD	mean mm	+ 1.5SD	CRL Days	- 1.5SD	mean mm	+ 1.5SD	CRL Days	- 1.5SD	mean mm	+ 1.5SD	CRL Days	- 1.5SD	mean mm	+ 1.5SD	CRL Days	- 1.5SD	mean mm	+ 1.5SD
49	6.3	8.7	11.1	58	10.6	14.9	19.3	67	19.3	25.7	32.2	76	31.0	39.5	48.1	85	44.3	54.8	65.3
50	6.6	9.1	11.7	59	11.3	15.9	20.6	68	20.4	27.1	33.9	77	32.5	41.2	49.9	86	45.7	56.5	67.3
51	6.8	9.6	12.5	60	12.1	16.9	21.7	69	21.6	28.5	35.4	78	33.8	42.8	51.8	87	47.3	58.2	69.2
52	7.2	10.2	13.2	61	12.9	18.0	23.1	70	22.8	30.0	37.2	79	35.4	44.5	53.7	88	48.7	59.9	71.2
53	7.5	10.8	14.1	62	14.0	19.2	24.5	71	24.2	31.5	38.9	80	36.8	46.2	55.7	89	50.2	61.6	73.0
54	8.1	11.5	15.0	63	14.9	20.4	26.0	72	25.5	33.1	40.8	81	38.3	47.9	57.5	90	51.5	63.2	74.9
55	8.5	12.2	16.0	64	15.9	21.6	27.3	73	26.9	34.7	42.5	82	39.7	49.6	59.5				
56	9.1	13.0	16.9	65	16.9	22.9	28.9	74	28.2	36.3	44.4	83	41.3	51.3	61.4				
57	9.7	13.9	18.1	66	18.2	24.3	30.5	75	29.7	37.9	46.2	84	42.7	53.0	63.4				

Crown Rump Length, JSUM

Japan Society of Ultrasonics in Medicine. "Standardization of Fetometry and Official Announcement of Diagnostic Guidelines." *J. Med. Ultrasonics* 28:844-872, 2001.

CRL Days	- 1.5SD	mean mm	+ 1.5SD	CRL Days	- 1.5SD	mean mm	+ 1.5SD	CRL Days	- 1.5SD	mean mm	+ 1.5SD	CRL Days	- 1.5SD	mean mm	+ 1.5SD	CRL Days	- 1.5SD	mean mm	+ 1.5SD
49	6.2	10.1	17.0	58	10.2	14.8	20.2	67	17.6	25.0	32.5	76	27.8	37.1	46.9	85	39.5	47.6	56.6
50	6.5	10.2	16.6	59	10.9	15.8	21.2	68	18.7	26.3	34.1	77	29.1	38.4	48.4	86	40.9	48.5	57.0
51	6.8	10.5	16.6	60	11.5	16.8	22.3	69	19.8	27.6	35.8	78	30.2	39.7	49.7	87	42.3	49.3	57.4
52	7.2	10.9	16.5	61	12.3	17.8	23.5	70	20.8	29.0	37.4	79	31.6	40.9	51.1	88	43.7	50.1	57.5
53	7.6	11.3	16.8	62	13.2	18.9	24.9	71	21.9	30.3	39.1	80	32.9	42.1	52.3	89	45.1	50.8	57.3
54	7.9	11.9	17.2	63	14.0	20.0	26.3	72	23.1	31.7	40.7	81	34.2	43.3	53.3	90	46.5	51.4	57.1
55	8.4	12.5	17.8	64	14.9	21.2	27.7	73	24.1	33.1	42.3	82	35.5	44.5	54.3				
56	9.0	13.2	18.3	65	15.7	22.5	29.3	74	25.3	34.4	44.0	83	36.9	45.5	55.2				
57	9.6	14.0	19.1	66	16.7	23.7	30.8	75	26.6	35.8	45.5	84	38.2	46.6	55.9				

Crown Rump Length, ASUM

Westerway SC. "Ultrasonic Fetal Measurements: New Australian Standards for the New Millennium." *Aust NZ J Obstet Gynaecol* 40:3:297-302, 2000.

CRL Day	mean mm	CRL Days	mean mm	CRL Days	mean mm	CRL Days	mean mm	CRL Days	mean mm
37	1.0	51	12.0	65	26.0	79	47.0	93	72.0
38	2.0	52	12.0	66	27.0	80	48.0	94	74.0
39	3.0	53	13.0	67	28.0	81	52.0	95	76.0
40	3.0	54	14.0	68	29.0	82	55.0	96	77.0
41	4.0	55	15.0	69	31.0	83	56.0	97	80.0
42	4.0	56	17.0	70	34.0	84	57.0	98	81.0
43	5.0	57	18.0	71	36.0	85	58.0	99	84.0
44	6.0	58	19.0	72	37.0	86	60.0	100	85.0
45	7.0	59	20.0	73	38.0	87	61.0	101	86.0
46	8.0	60	21.0	74	39.0	88	63.0	102	87.0
47	9.0	61	22.0	75	39.0	89	64.0		
48	10.0	62	22.0	76	40.0	90	65.0		
49	11.0	63	23.0	77	44.0	91	68.0		
50	11.0	64	24.0	78	45.0	92	70.0		

Biparietal Diameter, Hadlock

Hadlock FP, Deter RL, Harrist RB, Park SK. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters." *Radiology* 152:497, 1984.

BPD(cm) = -3.08 + 0.41 * MA(wks) - 0.000061 * MA(wks)^3 1 Standard Deviation = ± 3 mm 5 & 95%: ± 4.9 mm

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
12	0	17.3	12.4	22.2	18	1	39.9	35.0	44.8	24	2	60.0	55.1	64.9	30	3	76.8	71.9	81.7	36	4	89.3	84.4	94.2
12	1	17.9	13.0	22.8	18	2	40.4	35.5	45.3	24	3	60.5	55.6	65.4	30	4	77.1	72.2	82.0	36	5	89.5	84.6	94.4
12	2	18.4	13.5	23.3	18	3	40.9	36.0	45.8	24	4	60.9	56.0	65.8	30	5	77.5	72.6	82.4	36	6	89.8	84.9	94.7
12	3	19.0	14.1	23.9	18	4	41.4	36.5	46.3	24	5	61.3	56.4	66.2	30	6	77.8	72.9	82.7	37	0	90.0	85.1	94.9
12	4	19.5	14.6	24.4	18	5	41.9	37.0	46.8	24	6	61.7	56.8	66.6	31	0	78.1	73.2	83.0	37	1	90.2	85.3	95.1
12	5	20.1	15.2	25.0	18	6	42.4	37.5	47.3	25	0	62.2	57.3	67.1	31	1	78.5	73.6	83.4	37	2	90.5	85.6	95.4
12	6	20.6	15.7	25.5	19	0	42.9	38.0	47.8	25	1	62.6	57.7	67.5	31	2	78.8	73.9	83.7	37	3	90.7	85.8	95.6
13	0	21.2	16.3	26.1	19	1	43.4	38.5	48.3	25	2	63.0	58.1	67.9	31	3	79.1	74.2	84.0	37	4	90.9	86.0	95.8
13	1	21.7	16.8	26.6	19	2	43.9	39.0	48.8	25	3	63.4	58.5	68.3	31	4	79.4	74.5	84.3	37	5	91.1	86.2	96.0
13	2	22.2	17.3	27.1	19	3	44.4	39.5	49.3	25	4	63.8	58.9	68.7	31	5	79.8	74.9	84.7	37	6	91.3	86.4	96.2
13	3	22.8	17.9	27.7	19	4	44.9	40.0	49.8	25	5	64.3	59.4	69.2	31	6	80.1	75.2	85.0	38	0	91.5	86.6	96.4
13	4	23.3	18.4	28.2	19	5	45.4	40.5	50.3	25	6	64.7	59.8	69.6	32	0	80.4	75.5	85.3	38	1	91.7	86.8	96.6
13	5	23.9	19.0	28.8	19	6	45.8	40.9	50.7	26	0	65.1	60.2	70.0	32	1	80.7	75.8	85.6	38	2	91.9	87.0	96.8
13	6	24.4	19.5	29.3	20	0	46.3	41.4	51.2	26	1	65.5	60.6	70.4	32	2	81.0	76.1	85.9	38	3	92.1	87.2	97.0
14	0	24.9	20.0	29.8	20	1	46.8	41.9	51.7	26	2	65.9	61.0	70.8	32	3	81.4	76.5	86.3	38	4	92.3	87.4	97.2
14	1	25.5	20.6	30.4	20	2	47.3	42.4	52.2	26	3	66.3	61.4	71.2	32	4	81.7	76.8	86.6	38	5	92.5	87.6	97.4
14	2	26.0	21.1	30.9	20	3	47.8	42.9	52.7	26	4	66.7	61.8	71.6	32	5	82.0	77.1	86.9	38	6	92.7	87.8	97.6
14	3	26.5	21.6	31.4	20	4	48.2	43.3	53.1	26	5	67.1	62.2	72.0	32	6	82.3	77.4	87.2	39	0	92.9	88.0	97.8
14	4	27.1	22.2	32.0	20	5	48.7	43.8	53.6	26	6	67.5	62.6	72.4	33	0	82.6	77.7	87.5	39	1	93.1	88.2	98.0
14	5	27.6	22.7	32.5	20	6	49.2	44.3	54.1	27	0	67.9	63.0	72.8	33	1	82.9	78.0	87.8	39	2	93.3	88.4	98.2
14	6	28.1	23.2	33.0	21	0	49.7	44.8	54.6	27	1	68.3	63.4	73.2	33	2	83.2	78.3	88.1	39	3	93.5	88.6	98.4
15	0	28.6	23.7	33.5	21	1	50.1	45.2	55.0	27	2	68.7	63.8	73.6	33	3	83.5	78.6	88.4	39	4	93.6	88.7	98.5
15	1	29.2	24.3	34.1	21	2	50.6	45.7	55.5	27	3	69.1	64.2	74.0	33	4	83.8	78.9	88.7	39	5	93.8	88.9	98.7
15	2	29.7	24.8	34.6	21	3	51.1	46.2	56.0	27	4	69.5	64.6	74.4	33	5	84.1	79.2	89.0	39	6	94.0	89.1	98.9
15	3	30.2	25.3	35.1	21	4	51.5	46.6	56.4	27	5	69.8	64.9	74.7	33	6	84.3	79.4	89.2	40	0	94.2	89.3	99.1
15	4	30.7	25.8	35.6	21	5	52.0	47.1	56.9	27	6	70.2	65.3	75.1	34	0	84.6	79.7	89.5	40	1	94.3	89.4	99.2
15	5	31.3	26.4	36.2	21	6	52.4	47.5	57.3	28	0	70.6	65.7	75.5	34	1	84.9	80.0	89.8	40	2	94.5	89.6	99.4
15	6	31.8	26.9	36.7	22	0	52.9	48.0	57.8	28	1	71.0	66.1	75.9	34	2	85.2	80.3	90.1	40	3	94.6	89.7	99.5
16	0	32.3	27.4	37.2	22	1	53.4	48.5	58.3	28	2	71.4	66.5	76.3	34	3	85.5	80.6	90.4	40	4	94.8	89.9	99.7
16	1	32.8	27.9	37.7	22	2	53.8	48.9	58.7	28	3	71.7	66.8	76.6	34	4	85.7	80.8	90.6	40	5	95.0	90.1	99.9
16	2	33.3	28.4	38.2	22	3	54.3	49.4	59.2	28	4	72.1	67.2	77.0	34	5	86.0	81.1	90.9	40	6	95.1	90.2	100.0
16	3	33.9	29.0	38.8	22	4	54.7	49.8	59.6	28	5	72.5	67.6	77.4	34	6	86.3	81.4	91.2	41	0	95.3	90.4	100.2
16	4	34.4	29.5	39.3	22	5	55.2	50.3	60.1	28	6	72.9	68.0	77.8	35	0	86.5	81.6	91.4	41	1	95.4	90.5	100.3
16	5	34.9	30.0	39.8	22	6	55.6	50.7	60.5	29	0	73.2	68.3	78.1	35	1	86.8	81.9	91.7	41	2	95.5	90.6	100.4
16	6	35.4	30.5	40.3	23	0	56.1	51.2	61.0	29	1	73.6	68.7	78.5	35	2	87.1	82.2	92.0	41	3	95.7	90.8	100.6
17	0	35.9	31.0	40.8	23	1	56.5	51.6	61.4	29	2	74.0	69.1	78.9	35	3	87.3	82.4	92.2	41	4	95.8	90.9	100.7
17	1	36.4	31.5	41.3	23	2	57.0	52.1	61.9	29	3	74.3	69.4	79.2	35	4	87.6	82.7	92.5	41	5	96.0	91.1	100.9
17	2	36.9	32.0	41.8	23	3	57.4	52.5	62.3	29	4	74.7	69.8	79.6	35	5	87.8	82.9	92.7	41	6	96.1	91.2	101.0
17	3	37.4	32.5	42.3	23	4	57.9	53.0	62.8	29	5	75.0	70.1	79.9	35	6	88.1	83.2	93.0	42	0	96.2	91.3	101.1
17	4	37.9	33.0	42.8	23	5	58.3	53.4	63.2	29	6	75.4	70.5	80.3	36	0	88.3	83.4	93.2					
17	5	38.4	33.5	43.3	23	6	58.7	53.8	63.6	30	0	75.7	70.8	80.6	36	1	88.6	83.7	93.5					
17	6	38.9	34.0	43.8	24	0	59.2	54.3	64.1	30	1	76.1	71.2	81.0	36	2	88.8	83.9	93.7					
18	0	39.4	34.5	44.3	24	1	59.6	54.7	64.5	30	2	76.4	71.5	81.3	36	3	89.1	84.2	94.0					

Biparietal Diameter, Lasser

Lasser DM, Peisner DB, Vollebergh J, Timor-Tritsch I. "First-trimester fetal biometry using transvaginal sonography." *Ultrasound in Obstetrics and Gynecology* 3:104, 1993.

BPD(mm) = 7.589 * log MA(days) - 12.68
95% Confidence Interval ± 0.164 cm
5 & 95%: ± 0.138 mm

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
7	0	.1	1.5	2.8	8	3	6.2	7.6	9.0	9	6	11.4	12.8	14.1	11	2	15.8	17.2	18.6	12	5	19.8	21.1	22.5
7	1	.8	2.1	3.5	8	4	6.8	8.1	9.5	10	0	11.8	13.2	14.6	11	3	16.2	17.6	19.0	12	6	20.1	21.5	22.9
7	2	1.4	2.8	4.2	8	5	7.3	8.7	10.1	10	1	12.3	13.7	15.1	11	4	16.7	18.0	19.4	13	0	20.5	21.9	23.3
7	3	2.0	3.4	4.8	8	6	7.8	9.2	10.6	10	2	12.8	14.2	15.5	11	5	17.1	18.4	19.8	13	1	20.9	22.2	23.6
7	4	2.7	4.1	5.4	9	0	8.4	9.8	11.1	10	3	13.2	14.6	16.0	11	6	17.5	18.8	20.2	13	2	21.2	22.6	24.0
7	5	3.3	4.7	6.1	9	1	8.9	10.3	11.7	10	4	13.7	15.1	16.4	12	0	17.9	19.2	20.6	13	3	21.6	22.9	24.3
7	6	3.9	5.3	6.7	9	2	9.4	10.8	12.2	10	5	14.1	15.5	16.9	12	1	18.2	19.6	21.0	13	4	21.9	23.3	24.7
8	0	4.5	5.9	7.2	9	3	9.9	11.3	12.7	10	6	14.6	15.9	17.3	12	2	18.6	20.0	21.4	13	5	22.3	23.6	25.0
8	1	5.1	6.5	7.8	9	4	10.4	11.8	13.2	11	0	15.0	16.4	17.7	12	3	19.0	20.4	21.8	13	6	22.6	24.0	25.4
8	2	5.6	7.0	8.4	9	5	10.9	12.3	13.6	11	1	15.4	16.8	18.2	12	4	19.4	20.8	22.1	14	0	22.9	24.3	25.7

Biparietal Diameter, Merz

Merz E, Kim-Kern M-S, Pehl S. " Ultrasonic Mensuration of Fetal Limb Bones in the Second and Third Trimesters." *Journal of Clinical Ultrasound* 15:175, March/April 1987.

5 & 95%: (2SD/2 * 1.645)

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
13	0	20.5	23.0	25.5	18	6	40.3	43.7	47.1	24	5	59.0	63.1	67.2	30	4	74.4	79.9	85.3	36	3	85.4	91.9	98.3
13	1	21.1	23.6	26.1	19	0	40.7	44.0	47.3	24	6	59.5	63.6	67.7	30	5	75.0	80.6	86.1	36	4	85.4	92.1	98.9
13	2	21.6	24.1	26.6	19	1	41.1	44.4	47.7	25	0	59.9	64.0	68.1	30	6	75.6	81.3	87.0	36	5	85.5	92.4	99.4
13	3	22.2	24.7	27.2	19	2	41.6	44.9	48.2	25	1	60.5	64.6	68.7	31	0	76.2	82.0	87.8	36	6	85.5	92.7	99.9
13	4	22.8	25.3	27.8	19	3	42.0	45.3	48.6	25	2	61.0	65.1	69.2	31	1	76.8	82.4	88.1	37	0	85.6	93.0	100.4
13	5	23.4	25.9	28.4	19	4	42.4	45.7	49.0	25	3	61.6	65.7	69.8	31	2	77.3	82.9	88.4	37	1	86.2	93.3	100.3
13	6	23.9	26.4	28.9	19	5	42.8	46.1	49.4	25	4	62.2	66.3	70.4	31	3	77.9	83.3	88.7	37	2	86.9	93.6	100.3
14	0	24.5	27.0	29.5	19	6	43.3	46.6	49.9	25	5	62.8	66.9	71.0	31	4	78.4	83.7	89.0	37	3	87.5	93.9	100.2
14	1	25.2	27.4	29.7	20	0	43.7	47.0	50.3	25	6	63.3	67.4	71.5	31	5	79.0	84.1	89.3	37	4	88.2	94.1	100.1
14	2	25.8	27.9	29.9	20	1	44.0	47.4	50.8	26	0	63.9	68.0	72.1	31	6	79.5	84.6	89.6	37	5	88.8	94.4	100.0
14	3	26.5	28.3	30.1	20	2	44.3	47.9	51.4	26	1	64.4	68.3	72.2	32	0	80.1	85.0	89.9	37	6	89.5	94.7	100.0
14	4	27.2	28.7	30.2	20	3	44.6	48.3	51.9	26	2	64.9	68.6	72.2	32	1	80.5	85.1	89.8	38	0	90.1	95.0	99.9
14	5	27.9	29.1	30.4	20	4	45.0	48.7	52.5	26	3	65.4	68.9	72.3	32	2	80.8	85.3	89.7	38	1	90.1	95.0	99.9
14	6	28.5	29.6	30.6	20	5	45.3	49.1	53.0	26	4	66.0	69.1	72.3	32	3	81.2	85.4	89.6	38	2	90.1	95.0	99.9
15	0	29.2	30.0	30.8	20	6	45.6	49.6	53.6	26	5	66.5	69.4	72.4	32	4	81.6	85.6	89.6	38	3	90.1	95.0	99.9
15	1	29.5	30.4	31.3	21	0	45.9	50.0	54.1	26	6	67.0	69.7	72.4	32	5	82.0	85.7	89.5	38	4	90.1	95.0	99.9
15	2	29.8	30.9	31.9	21	1	46.6	50.7	54.8	27	0	67.5	70.0	72.5	32	6	82.3	85.9	89.4	38	5	90.1	95.0	99.9
15	3	30.1	31.3	32.4	21	2	47.3	51.4	55.5	27	1	67.7	70.4	73.2	33	0	82.7	86.0	89.3	38	6	90.1	95.0	99.9
15	4	30.5	31.7	33.0	21	3	48.0	52.1	56.2	27	2	67.9	70.9	73.8	33	1	83.0	86.4	89.8	39	0	90.1	95.0	99.9
15	5	30.8	32.1	33.5	21	4	48.8	52.9	57.0	27	3	68.1	71.3	74.5	33	2	83.3	86.9	90.4	39	1	90.4	95.6	100.7
15	6	31.1	32.6	34.1	21	5	49.5	53.6	57.7	27	4	68.3	71.7	75.1	33	3	83.6	87.3	90.9	39	2	90.8	96.1	101.5
16	0	31.4	33.0	34.6	21	6	50.2	54.3	58.4	27	5	68.5	72.1	75.8	33	4	84.0	87.7	91.5	39	3	91.1	96.7	102.3
16	1	31.8	33.6	35.3	22	0	50.9	55.0	59.1	27	6	68.7	72.6	76.4	33	5	84.3	88.1	92.0	39	4	91.4	97.3	103.2
16	2	32.3	34.1	36.0	22	1	51.3	55.4	59.5	28	0	68.9	73.0	77.1	33	6	84.6	88.6	92.6	39	5	91.7	97.9	104.0
16	3	32.7	34.7	36.7	22	2	51.8	55.9	60.0	28	1	69.3	73.4	77.5	34	0	84.9	89.0	93.1	39	6	92.1	98.4	104.8
16	4	33.2	35.3	37.4	22	3	52.2	56.3	60.4	28	2	69.8	73.9	78.0	34	1	84.7	89.0	93.3	40	0	92.4	99.0	105.6
16	5	33.6	35.9	38.1	22	4	52.6	56.7	60.8	28	3	70.2	74.3	78.4	34	2	84.4	89.0	93.6	40	1	92.4	98.7	105.1
16	6	34.1	36.4	38.8	22	5	53.0	57.1	61.2	28	4	70.6	74.7	78.8	34	3	84.2	89.0	93.8	40	2	92.3	98.4	104.5
17	0	34.5	37.0	39.5	22	6	53.5	57.6	61.7	28	5	71.0	75.1	79.2	34	4	83.9	89.0	94.1	40	3	92.3	98.1	104.0
17	1	35.0	37.7	40.4	23	0	53.9	58.0	62.1	28	6	71.5	75.6	79.7	34	5	83.7	89.0	94.3	40	4	92.2	97.9	103.5
17	2	35.5	38.4	41.4	23	1	54.3	58.4	62.5	29	0	71.9	76.0	80.1	34	6	83.4	89.0	94.6	40	5	92.2	97.6	103.0
17	3	36.0	39.1	42.3	23	2	54.8	58.9	63.0	29	1	71.9	76.1	80.4	35	0	83.2	89.0	94.8	40	6	92.1	97.3	102.4
17	4	36.4	39.9	43.3	23	3	55.2	59.3	63.4	29	2	72.0	76.3	80.6	35	1	83.5	89.3	95.1	41	0	92.1	97.0	101.9
17	5	36.9	40.6	44.2	23	4	55.6	59.7	63.8	29	3	72.0	76.4	80.9	35	2	83.8	89.6	95.4	41	1	92.6	97.4	102.2
17	6	37.4	41.3	45.2	23	5	56.0	60.1	64.2	29	4	72.0	76.6	81.1	35	3	84.1	89.9	95.7	41	2	93.2	97.9	102.5
18	0	37.9	42.0	46.1	23	6	56.5	60.6	64.7	29	5	72.0	76.7	81.4	35	4	84.3	90.1	95.9	41	3	93.7	98.3	102.8
18	1	38.3	42.3	46.3	24	0	56.9	61.0	65.1	29	6	72.1	76.9	81.6	35	5	84.6	90.4	96.2	41	4	94.3	98.7	103.2
18	2	38.7	42.6	46.4	24	1	57.3	61.4	65.5	30	0	72.1	77.0	81.9	35	6	84.9	90.7	96.5	41	5	94.8	99.1	103.5
18	3	39.1	42.9	46.6	24	2	57.8	61.9	66.0	30	1	72.7	77.7	82.7	36	0	85.2	91.0	96.8	41	6	95.4	99.6	103.8
18	4	39.5	43.1	46.8	24	3	58.2	62.3	66.4	30	2	73.3	78.4	83.6	36	1	85.3	91.3	97.3	42	0	95.9	100.0	104.1
18	5	39.9	43.4	47.0	24	4	58.6	62.7	66.8	30	3	73.9	79.1	84.4	36	2	85.3	91.6	97.8					

Biparietal Diameter, Rempen

Rempen A. "Biometrie in der Frühgravidität (I. Trimenon) (Biometry in Early Pregnancy (1st Trimester))." *Der Frauenarzt* 32:425, 1991, p. 427.

5 & 95%: ±3.7 mm

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
6	2	0	2.0	5.7	7	6	3.4	7.1	10.8	9	3	8.4	12.1	15.8	11	0	13.3	17.0	20.7	12	4	18.1	21.8	25.5
6	3	0	2.5	6.2	8	0	3.9	7.6	11.3	9	4	8.8	12.5	16.2	11	1	13.7	17.4	21.1	12	5	18.5	22.2	25.9
6	4	0	3.0	6.7	8	1	4.3	8.0	11.7	9	5	9.3	13.0	16.7	11	2	14.2	17.9	21.6	12	6	18.9	22.6	26.3
6	5	0	3.4	7.1	8	2	4.8	8.5	12.2	9	6	9.7	13.4	17.1	11	3	14.6	18.3	22.0	13	0	19.4	23.1	26.8
6	6	.2	3.9	7.6	8	3	5.2	8.9	12.6	10	0	10.2	13.9	17.6	11	4	15.0	18.7	22.4	13	1	19.8	23.5	27.2
7	0	.6	4.3	8.0	8	4	5.7	9.4	13.1	10	1	10.6	14.3	18.0	11	5	15.5	19.2	22.9	13	2	20.2	23.9	27.6
7	1	1.1	4.8	8.5	8	5	6.1	9.8	13.5	10	2	11.1	14.8	18.5	11	6	15.9	19.6	23.3					
7	2	1.6	5.3	9.0	8	6	6.6	10.3	14.0	10	3	11.5	15.2	18.9	12	0	16.3	20.0	23.7					
7	3	2.0	5.7	9.4	9	0	7.0	10.7	14.4	10	4	12.0	15.7	19.4	12	1	16.8	20.5	24.2					
7	4	2.5	6.2	9.9	9	1	7.5	11.2	14.9	10	5	12.4	16.1	19.8	12	2	17.2	20.9	24.6					
7	5	3.0	6.7	10.4	9	2	7.9	11.6	15.3	10	6	12.8	16.5	20.2	12	3	17.6	21.3	25.0					

Biparietal Diameter, Hansmann

Hansmann M, Hackelöer B-J, Staudach A. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, 1985, p. 176.

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
10	0	9.0	14.0	18.0	16	1	30.6	35.4	39.6	22	2	50.9	55.9	59.9	28	3	68.9	73.3	77.9	34	4	82.1	86.6	91.1
10	1	9.6	14.4	18.6	16	2	31.1	35.9	40.1	22	3	51.3	56.3	60.3	28	4	69.1	73.7	78.1	34	5	82.4	86.7	91.4
10	2	10.1	14.9	19.1	16	3	31.7	36.3	40.7	22	4	51.7	56.7	60.7	28	5	69.4	74.1	78.4	34	6	82.7	86.9	91.7
10	3	10.7	15.3	19.7	16	4	32.3	36.7	41.3	22	5	52.1	57.1	61.1	28	6	69.7	74.6	78.7	35	0	83.0	87.0	92.0
10	4	11.3	15.7	20.3	16	5	32.9	37.1	41.9	22	6	52.6	57.6	61.6	29	0	70.0	75.0	79.0	35	1	83.1	87.3	92.1
10	5	11.9	16.1	20.9	16	6	33.4	37.6	42.4	23	0	53.0	58.0	62.0	29	1	70.4	75.3	79.4	35	2	83.3	87.6	92.3
10	6	12.4	16.6	21.4	17	0	34.0	38.0	43.0	23	1	53.4	58.4	62.4	29	2	70.9	75.6	79.9	35	3	83.4	87.9	92.4
11	0	13.0	17.0	22.0	17	1	34.4	38.6	43.4	23	2	53.9	58.9	62.9	29	3	71.3	75.9	80.3	35	4	83.6	88.1	92.6
11	1	13.4	17.6	22.4	17	2	34.9	39.1	43.9	23	3	54.3	59.3	63.3	29	4	71.7	76.1	80.7	35	5	83.7	88.4	92.7
11	2	13.9	18.1	22.9	17	3	35.3	39.7	44.3	23	4	54.7	59.7	63.7	29	5	72.1	76.4	81.1	35	6	83.9	88.7	92.9
11	3	14.3	18.7	23.3	17	4	35.7	40.3	44.7	23	5	55.1	60.1	64.1	29	6	72.6	76.7	81.6	36	0	84.0	89.0	93.0
11	4	14.7	19.3	23.7	17	5	36.1	40.9	45.1	23	6	55.6	60.6	64.6	30	0	73.0	77.0	82.0	36	1	84.3	89.1	93.3
11	5	15.1	19.9	24.1	17	6	36.6	41.4	45.6	24	0	56.0	61.0	65.0	30	1	73.3	77.3	82.3	36	2	84.6	89.3	93.6
11	6	15.6	20.4	24.6	18	0	37.0	42.0	46.0	24	1	56.4	61.4	65.4	30	2	73.6	77.6	82.6	36	3	84.9	89.4	93.9
12	0	16.0	21.0	25.0	18	1	37.4	42.4	46.4	24	2	56.9	61.9	65.9	30	3	73.9	77.9	82.9	36	4	85.1	89.6	94.1
12	1	16.6	21.4	25.6	18	2	37.9	42.9	46.9	24	3	57.3	62.3	66.3	30	4	74.1	78.1	83.1	36	5	85.4	89.7	94.4
12	2	17.1	21.9	26.1	18	3	38.3	43.3	47.3	24	4	57.7	62.7	66.7	30	5	74.4	78.4	83.4	36	6	85.7	89.9	94.7
12	3	17.7	22.3	26.7	18	4	38.7	43.7	47.7	24	5	58.1	63.1	67.1	30	6	74.7	78.7	83.7	37	0	86.0	90.0	95.0
12	4	18.3	22.7	27.3	18	5	39.1	44.1	48.1	24	6	58.6	63.6	67.6	31	0	75.0	79.0	84.0	37	1	86.1	90.1	95.1
12	5	18.9	23.1	27.9	18	6	39.6	44.6	48.6	25	0	59.0	64.0	68.0	31	1	75.3	79.4	84.3	37	2	86.3	90.3	95.3
12	6	19.4	23.6	28.4	19	0	40.0	45.0	49.0	25	1	59.4	64.4	68.4	31	2	75.6	79.9	84.6	37	3	86.4	90.4	95.4
13	0	20.0	24.0	29.0	19	1	40.6	45.4	49.6	25	2	59.9	64.9	68.9	31	3	75.9	80.3	84.9	37	4	86.6	90.6	95.6
13	1	20.4	24.6	29.4	19	2	41.1	45.9	50.1	25	3	60.3	65.3	69.3	31	4	76.1	80.7	85.1	37	5	86.7	90.7	95.7
13	2	20.9	25.1	29.9	19	3	41.7	46.3	50.7	25	4	60.7	65.7	69.7	31	5	76.4	81.1	85.4	37	6	86.9	90.9	95.9
13	3	21.3	25.7	30.3	19	4	42.3	46.7	51.3	25	5	61.1	66.1	70.1	31	6	76.7	81.6	85.7	38	0	87.0	91.0	96.0
13	4	21.7	26.3	30.7	19	5	42.9	47.1	51.9	25	6	61.6	66.6	70.6	32	0	77.0	82.0	86.0	38	1	87.1	91.3	96.1
13	5	22.1	26.9	31.1	19	6	43.4	47.6	52.4	26	0	62.0	67.0	71.0	32	1	77.3	82.3	86.3	38	2	87.3	91.6	96.3
13	6	22.6	27.4	31.6	20	0	44.0	48.0	53.0	26	1	62.4	67.4	71.4	32	2	77.6	82.6	86.6	38	3	87.4	91.9	96.4
14	0	23.0	28.0	32.0	20	1	44.4	48.4	53.4	26	2	62.9	67.9	71.9	32	3	77.9	82.9	86.9	38	4	87.6	92.1	96.6
14	1	23.6	28.4	32.6	20	2	44.9	48.9	53.9	26	3	63.3	68.3	72.3	32	4	78.1	83.1	87.1	38	5	87.7	92.4	96.7
14	2	24.1	28.9	33.1	20	3	45.3	49.3	54.3	26	4	63.7	68.7	72.7	32	5	78.4	83.4	87.4	38	6	87.9	92.7	96.9
14	3	24.7	29.3	33.7	20	4	45.7	49.7	54.7	26	5	64.1	69.1	73.1	32	6	78.7	83.7	87.7	39	0	88.0	93.0	97.0
14	4	25.3	29.7	34.3	20	5	46.1	50.1	55.1	26	6	64.6	69.6	73.6	33	0	79.0	84.0	88.0	39	1	88.1	93.0	97.1
14	5	25.9	30.1	34.9	20	6	46.6	50.6	55.6	27	0	65.0	70.0	74.0	33	1	79.3	84.3	88.3	39	2	88.3	93.0	97.3
14	6	26.4	30.6	35.4	21	0	47.0	51.0	56.0	27	1	65.4	70.3	74.4	33	2	79.6	84.6	88.6	39	3	88.4	93.0	97.4
15	0	27.0	31.0	36.0	21	1	47.4	51.6	56.4	27	2	65.9	70.6	74.9	33	3	79.9	84.9	88.9	39	4	88.6	93.0	97.6
15	1	27.4	31.6	36.4	21	2	47.9	52.1	56.9	27	3	66.3	70.9	75.3	33	4	80.1	85.1	89.1	39	5	88.7	93.0	97.7
15	2	27.9	32.1	36.9	21	3	48.3	52.7	57.3	27	4	66.7	71.1	75.7	33	5	80.4	85.4	89.4	39	6	88.9	93.0	97.9
15	3	28.3	32.7	37.3	21	4	48.7	53.3	57.7	27	5	67.1	71.4	76.1	33	6	80.7	85.7	89.7	40	0	89.0	93.0	98.0
15	4	28.7	33.3	37.7	21	5	49.1	53.9	58.1	27	6	67.6	71.7	76.6	34	0	81.0	86.0	90.0					
15	5	29.1	33.9	38.1	21	6	49.6	54.4	58.6	28	0	68.0	72.0	77.0	34	1	81.3	86.1	90.3					
15	6	29.6	34.4	38.6	22	0	50.0	55.0	59.0	28	1	68.3	72.4	77.3	34	2	81.6	86.3	90.6					
16	0	30.0	35.0	39.0	22	1	50.4	55.4	59.4	28	2	68.6	72.9	77.6	34	3	81.9	86.4	90.9					

Biparietal Diameter, Tokyo

Masuda H, Shinozuka N, Okai T, Mizuno M. "Diagnosis of the Week of Pregnancy and Prognosis." *Perinatal Care* 8:719-726.

BPD Days	- 1.5SD	mean mm	+ 1.5SD	BPD Days	- 1.5SD	mean mm	+ 1.5SD	BPD Days	- 1.5SD	mean mm	+ 1.5SD	BPD Days	- 1.5SD	mean mm	+ 1.5SD	BPD Days	- 1.5SD	mean mm	+ 1.5SD
84	14.4	19.5	24.1	125	34.9	39.4	43.1	166	52.7	57.9	62.7	207	67.5	74.2	79.9	248	79.3	86.8	92.5
85	14.9	20.0	24.5	126	35.4	39.9	43.6	167	53.1	58.4	63.1	208	67.9	74.6	80.2	249	79.6	87.1	92.8
86	15.4	20.5	25.0	127	35.9	40.3	44.1	168	53.5	58.8	63.6	209	68.2	74.9	80.6	250	79.8	87.3	93.0
87	16.0	21.0	25.4	128	36.3	40.8	44.6	169	53.9	59.2	64.0	210	68.5	75.3	81.0	251	80.1	87.6	93.2
88	16.5	21.5	25.9	129	36.8	41.3	45.1	170	54.3	59.7	64.5	211	68.8	75.6	81.3	252	80.3	87.8	93.5
89	17.0	22.0	26.3	130	37.3	41.7	45.6	171	54.7	60.1	64.9	212	69.1	76.0	81.7	253	80.6	88.1	93.7
90	17.6	22.5	26.7	131	37.7	42.2	46.0	172	55.1	60.5	65.4	213	69.5	76.3	82.1	254	80.8	88.3	93.9
91	18.1	23.0	27.2	132	38.2	42.7	46.5	173	55.4	60.9	65.8	214	69.8	76.7	82.4	255	81.0	88.5	94.1
92	18.6	23.5	27.6	133	38.6	43.1	47.0	174	55.8	61.3	66.3	215	70.1	77.0	82.8	256	81.3	88.8	94.3
93	19.1	24.0	28.1	134	39.1	43.6	47.5	175	56.2	61.8	66.7	216	70.4	77.3	83.1	257	81.5	89.0	94.5
94	19.6	24.5	28.5	135	39.5	44.1	48.0	176	56.6	62.2	67.2	217	70.7	77.7	83.5	258	81.7	89.2	94.7
95	20.2	24.9	29.0	136	40.0	44.5	48.5	177	57.0	62.6	67.6	218	71.0	78.0	83.8	259	82.0	89.4	94.9
96	20.7	25.4	29.4	137	40.4	45.0	48.9	178	57.4	63.0	68.0	219	71.3	78.3	84.1	260	82.2	89.6	95.1
97	21.2	25.9	29.9	138	40.9	45.5	49.4	179	57.7	63.4	68.5	220	71.6	78.7	84.5	261	82.4	89.8	95.3
98	21.7	26.4	30.4	139	41.3	45.9	49.9	180	58.1	63.8	68.9	221	71.9	79.0	84.8	262	82.6	90.0	95.5
99	22.2	26.9	30.8	140	41.8	46.4	50.4	181	58.5	64.2	69.4	222	72.2	79.3	85.1	263	82.9	90.2	95.7
100	22.7	27.4	31.3	141	42.2	46.8	50.9	182	58.8	64.6	69.8	223	72.5	79.6	85.5	264	83.1	90.4	95.9
101	23.2	27.9	31.7	142	42.7	47.3	51.3	183	59.2	65.0	70.2	224	72.8	80.0	85.8	265	83.3	90.6	96.1
102	23.7	28.4	32.2	143	43.1	47.7	51.8	184	59.6	65.4	70.6	225	73.1	80.3	86.1	266	83.5	90.8	96.2
103	24.3	28.8	32.7	144	43.5	48.2	52.3	185	59.9	65.8	71.1	226	73.4	80.6	86.4	267	83.7	91.0	96.4
104	24.8	29.3	33.1	145	44.0	48.7	52.8	186	60.3	66.2	71.5	227	73.7	80.9	86.7	268	83.9	91.2	96.6
105	25.3	29.8	33.6	146	44.4	49.1	53.3	187	60.7	66.6	71.9	228	74.0	81.2	87.1	269	84.2	91.4	96.7
106	25.8	30.3	34.1	147	44.8	49.6	53.7	188	61.0	67.0	72.3	229	74.3	81.5	87.4	270	84.4	91.6	96.9
107	26.3	30.8	34.5	148	45.3	50.0	54.2	189	61.4	67.4	72.8	230	74.5	81.8	87.7	271	84.6	91.7	97.0
108	26.8	31.3	35.0	149	45.7	50.5	54.7	190	61.7	67.8	73.2	231	74.8	82.1	88.0	272	84.8	91.9	97.2
109	27.2	31.8	35.5	150	46.1	50.9	55.2	191	62.1	68.2	73.6	232	75.1	82.4	88.3	273	85.0	92.1	97.3
110	27.7	32.2	36.0	151	46.5	51.4	55.7	192	62.5	68.6	74.0	233	75.4	82.7	88.6	274	85.2	92.2	97.4
111	28.2	32.7	36.4	152	47.0	51.8	56.1	193	62.8	69.0	74.4	234	75.7	83.0	88.8	275	85.4	92.4	97.6
112	28.7	33.2	36.9	153	47.4	52.3	56.6	194	63.2	69.4	74.8	235	75.9	83.3	89.1	276	85.6	92.6	97.7
113	29.2	33.7	37.4	154	47.8	52.7	57.1	195	63.5	69.8	75.2	236	76.2	83.6	89.4	277	85.8	92.7	97.8
114	29.7	34.2	37.9	155	48.2	53.1	57.5	196	63.8	70.1	75.6	237	76.5	83.9	89.7	278	86.0	92.9	98.0
115	30.2	34.6	38.3	156	48.6	53.6	58.0	197	64.2	70.5	76.0	238	76.7	84.2	90.0	279	86.2	93.0	98.1
116	30.7	35.1	38.8	157	49.1	54.0	58.5	198	64.5	70.9	76.4	239	77.0	84.5	90.2	280	86.3	93.1	98.2
117	31.2	35.6	39.3	158	49.5	54.5	59.0	199	64.9	71.3	76.8	240	77.3	84.7	90.5	281	86.5	93.3	98.3
118	31.6	36.1	39.8	159	49.9	54.9	59.4	200	65.2	71.6	77.2	241	77.5	85.0	90.8	282	86.7	93.4	98.4
119	32.1	36.5	40.3	160	50.3	55.3	59.9	201	65.6	72.0	77.6	242	77.8	85.3	91.0	283	86.9	93.5	98.5
120	32.6	37.0	40.7	161	50.7	55.8	60.3	202	65.9	72.4	78.0	243	78.1	85.5	91.3	284	87.1	93.7	98.6
121	33.1	37.5	41.2	162	51.1	56.2	60.8	203	66.2	72.8	78.4	244	78.3	85.8	91.6	285	87.3	93.8	98.7
122	33.5	38.0	41.7	163	51.5	56.7	61.3	204	66.6	73.1	78.7	245	78.6	86.1	91.8	286	87.4	93.9	98.8
123	34.0	38.4	42.2	164	51.9	57.1	61.7	205	66.9	73.5	79.1	246	78.8	86.3	92.1	287	87.6	94.0	98.8
124	34.5	38.9	42.7	165	52.3	57.5	62.2	206	67.2	73.8	79.5	247	79.1	86.6	92.3				

Biparietal Diameter, Osaka

Aoki M, Yamada M. "Examining Fetal Growth." *Obstetrics and Gynecology* 47:547-556, 1983.

BPD Days	- 1.5SD	mean mm	+ 1.5SD	BPD Days	- 1.5SD	mean mm	+ 1.5SD	BPD Days	- 1.5SD	mean mm	+ 1.5SD	BPD Days	- 1.5SD	mean mm	+ 1.5SD	BPD Days	- 1.5SD	mean mm	+ 1.5SD
70	10.5	13.3	16.2	113	32.0	35.7	39.5	156	51.2	55.7	60.2	199	68.3	73.4	78.5	242	81.8	87.3	92.9
71	11.0	13.8	16.7	114	32.5	36.2	40.0	157	51.6	56.1	60.6	200	68.6	73.8	79.1	243	82.0	87.5	93.1
72	11.6	14.4	17.3	115	33.0	36.7	40.5	158	52.0	56.6	61.3	201	69.0	74.2	79.5	244	82.3	87.8	93.4
73	12.2	15.0	17.9	116	33.5	37.2	41.0	159	52.4	57.0	61.7	202	69.3	74.5	79.8	245	82.5	88.0	93.6
74	12.7	15.5	18.4	117	33.8	37.7	41.6	160	52.8	57.4	62.1	203	69.7	74.9	80.2	246	82.6	88.3	94.0
75	13.3	16.1	19.0	118	34.2	38.1	42.0	161	53.3	57.9	62.6	204	70.1	75.3	80.6	247	82.8	88.5	94.2
76	13.6	16.6	19.6	119	34.7	38.6	42.5	162	53.7	58.3	63.0	205	70.4	75.6	80.9	248	83.0	88.7	94.4
77	14.2	17.2	20.2	120	35.2	39.1	43.0	163	54.1	58.7	63.4	206	70.8	76.0	81.3	249	83.3	89.0	94.7
78	14.7	17.7	20.7	121	35.7	39.6	43.5	164	54.6	59.2	63.9	207	71.2	76.4	81.7	250	83.5	89.2	94.9
79	15.3	18.3	21.3	122	36.2	40.1	44.0	165	55.0	59.6	64.3	208	71.5	76.7	82.0	251	83.7	89.4	95.1
80	15.8	18.8	21.8	123	36.6	40.5	44.4	166	55.4	60.0	64.7	209	71.9	77.1	82.4	252	83.9	89.6	95.3
81	16.3	19.3	22.3	124	37.0	41.0	45.1	167	55.7	60.5	65.3	210	72.2	77.4	82.7	253	84.1	89.8	95.5
82	16.8	19.9	23.1	125	37.5	41.5	45.6	168	56.1	60.9	65.7	211	72.6	77.8	83.1	254	84.3	90.0	95.7
83	17.3	20.4	23.6	126	38.0	42.0	46.1	169	56.5	61.3	66.1	212	72.9	78.1	83.4	255	84.5	90.2	95.9
84	17.8	20.9	24.1	127	38.4	42.4	46.5	170	56.9	61.7	66.5	213	73.1	78.5	83.9	256	84.7	90.4	96.1
85	18.4	21.5	24.7	128	38.9	42.9	47.0	171	57.4	62.2	67.0	214	73.4	78.8	84.2	257	84.9	90.6	96.3
86	18.9	22.0	25.2	129	39.4	43.4	47.5	172	57.8	62.6	67.4	215	73.8	79.2	84.6	258	85.1	90.8	96.5
87	19.4	22.5	25.7	130	39.9	43.9	48.0	173	58.2	63.0	67.8	216	74.1	79.5	84.9	259	85.3	91.0	96.7
88	20.0	23.1	26.3	131	40.3	44.3	48.4	174	58.6	63.4	68.2	217	74.4	79.8	85.2	260	85.5	91.2	96.9
89	20.3	23.6	26.9	132	40.6	44.8	49.0	175	59.1	63.9	68.7	218	74.8	80.2	85.6	261	85.7	91.4	97.1
90	20.8	24.1	27.4	133	41.1	45.3	49.5	176	59.5	64.3	69.1	219	75.1	80.5	85.9	262	85.8	91.5	97.2
91	21.3	24.6	27.9	134	41.5	45.7	49.9	177	59.8	64.7	69.7	220	75.4	80.8	86.2	263	86.0	91.7	97.4
92	21.9	25.2	28.5	135	42.0	46.2	50.4	178	60.2	65.1	70.1	221	75.8	81.2	86.6	264	86.1	91.8	97.5
93	22.4	25.7	29.0	136	42.5	46.7	50.9	179	60.6	65.5	70.5	222	76.1	81.5	86.9	265	86.3	92.0	97.7
94	22.9	26.2	29.5	137	42.9	47.1	51.3	180	61.0	65.9	70.9	223	76.4	81.8	87.2	266	86.4	92.1	97.8
95	23.3	26.7	30.2	138	43.4	47.6	51.8	181	61.4	66.3	71.3	224	76.7	82.1	87.5	267	86.6	92.3	98.0
96	23.8	27.2	30.7	139	43.8	48.0	52.2	182	61.8	66.7	71.7	225	77.0	82.4	87.8	268	86.7	92.4	98.1
97	24.3	27.7	31.2	140	44.2	48.5	52.9	183	62.2	67.1	72.1	226	77.3	82.7	88.1	269	86.8	92.6	98.5
98	24.8	28.2	31.7	141	44.7	49.0	53.4	184	62.6	67.5	72.5	227	77.7	83.1	88.5	270	86.9	92.7	98.6
99	25.3	28.7	32.2	142	45.1	49.4	53.8	185	63.1	68.0	73.0	228	77.9	83.4	89.0	271	87.0	92.8	98.7
100	25.9	29.3	32.8	143	45.6	49.9	54.3	186	63.5	68.4	73.4	229	78.2	83.7	89.3	272	87.1	92.9	98.8
101	26.4	29.8	33.3	144	46.0	50.3	54.7	187	63.9	68.8	73.8	230	78.5	84.0	89.6	273	87.2	93.0	98.9
102	26.7	30.3	33.9	145	46.5	50.8	55.2	188	64.1	69.2	74.3	231	78.8	84.3	89.9	274	87.3	93.1	99.0
103	27.2	30.8	34.4	146	46.9	51.2	55.6	189	64.4	69.5	74.6	232	79.1	84.6	90.2	275	87.4	93.2	99.1
104	27.7	31.3	34.9	147	47.4	51.7	56.1	190	64.8	69.9	75.0	233	79.3	84.8	90.4	276	87.5	93.3	99.2
105	28.2	31.8	35.4	148	47.8	52.1	56.5	191	65.2	70.3	75.4	234	79.6	85.1	90.7	277	87.6	93.4	99.3
106	28.7	32.3	35.9	149	48.1	52.6	57.1	192	65.6	70.7	75.8	235	79.9	85.4	91.0	278	87.7	93.5	99.4
107	29.2	32.8	36.4	150	48.5	53.0	57.5	193	66.0	71.1	76.2	236	80.2	85.7	91.3	279	87.8	93.6	99.5
108	29.7	33.3	36.9	151	49.0	53.5	58.0	194	66.4	71.5	76.6	237	80.5	86.0	91.6	280	87.8	93.6	99.5
109	30.1	33.8	37.6	152	49.4	53.9	58.4	195	66.8	71.9	77.0	238	80.7	86.2	91.8				
110	30.5	34.2	38.0	153	49.9	54.4	58.9	196	67.2	72.3	77.4	239	81.0	86.5	92.1				
111	31.0	34.7	38.5	154	50.3	54.8	59.3	197	67.6	72.7	77.8	240	81.3	86.8	92.4				
112	31.5	35.2	39.0	155	50.7	55.2	59.7	198	67.9	73.0	78.1	241	81.5	87.0	92.6				

Biparietal Diameter, JSUM

Japan Society of Ultrasonics in Medicine. "Standardization of Fetometry and Official Announcement of Diagnostic Guidelines." *J. Med. Ultrasonics* 28:844-872, 2001.

BPD Days	- 1.5SD	mean mm	+ 1.5SD	BPD Days	- 1.5SD	mean mm	+ 1.5SD	BPD Days	- 1.5SD	mean mm	+ 1.5SD	BPD Days	- 1.5SD	mean mm	+ 1.5SD	BPD Days	- 1.5SD	mean mm	+ 1.5SD
70	9.2	12.6	16.0	115	30.4	34.4	38.4	160	50.8	55.3	59.8	205	68.3	73.3	78.4	250	80.9	86.4	92.0
71	9.6	13.1	16.5	116	30.9	34.8	38.9	161	51.2	55.7	60.3	206	68.6	73.7	78.7	251	81.1	86.7	92.3
72	10.1	13.5	17.0	117	31.3	35.3	39.4	162	51.6	56.1	60.7	207	69.0	74.0	79.1	252	81.3	86.9	92.5
73	10.6	14.0	17.5	118	31.8	35.8	39.9	163	52.0	56.6	61.2	208	69.3	74.4	79.5	253	81.5	87.1	92.7
74	11.0	14.5	17.9	119	32.3	36.3	40.4	164	52.5	57.0	61.6	209	69.7	74.7	79.8	254	81.7	87.3	92.9
75	11.5	15.0	18.4	120	32.7	36.8	40.8	165	52.9	57.5	62.0	210	70.0	75.1	80.2	255	81.8	87.5	93.2
76	12.0	15.4	18.9	121	33.2	37.2	41.3	166	53.3	57.9	62.5	211	70.3	75.4	80.5	256	82.0	87.7	93.4
77	12.5	15.9	19.4	122	33.7	37.7	41.8	167	53.7	58.4	62.9	212	70.6	75.8	80.9	257	82.2	87.9	93.6
78	12.9	16.4	19.9	123	34.1	38.2	42.3	168	54.2	58.8	63.4	213	71.0	76.1	81.2	258	82.4	88.1	93.8
79	13.4	16.9	20.4	124	34.6	38.7	42.8	169	54.6	59.2	63.8	214	71.3	76.4	81.6	259	82.6	88.3	94.0
80	13.8	17.4	20.9	125	35.1	39.1	43.2	170	55.0	59.6	64.2	215	71.6	76.7	81.9	260	82.8	88.5	94.2
81	14.3	17.8	21.4	126	35.6	39.6	43.7	171	55.4	60.0	64.7	216	71.9	77.1	82.2	261	83.0	88.7	94.4
82	14.8	18.3	21.9	127	36.0	40.1	44.2	172	55.8	60.5	65.1	217	72.2	77.4	82.6	262	83.1	88.9	94.6
83	15.2	18.8	22.4	128	36.5	40.6	44.7	173	56.2	60.9	65.6	218	72.5	77.7	82.9	263	83.3	89.0	94.8
84	15.7	19.3	22.9	129	36.9	41.1	45.2	174	56.6	61.3	66.0	219	72.8	78.0	83.2	264	83.5	89.2	95.0
85	16.2	19.8	23.4	130	37.4	41.5	45.7	175	57.1	61.7	66.4	220	73.1	78.3	83.6	265	83.7	89.4	95.2
86	16.7	20.3	23.9	131	37.9	42.0	46.2	176	57.5	62.1	66.9	221	73.4	78.7	83.9	266	83.8	89.6	95.4
87	17.1	20.8	24.4	132	38.3	42.5	46.6	177	57.9	62.5	67.3	222	73.7	79.0	84.2	267	84.0	89.7	95.5
88	17.6	21.2	24.9	133	38.8	43.0	47.1	178	58.3	62.9	67.7	223	74.0	79.3	84.5	268	84.1	89.9	95.7
89	18.1	21.7	25.4	134	39.3	43.5	47.6	179	58.7	63.4	68.1	224	74.4	79.6	84.9	269	84.2	90.0	95.8
90	18.6	22.2	25.9	135	39.7	43.9	48.1	180	59.1	63.8	68.6	225	74.6	79.9	85.2	270	84.4	90.2	96.0
91	19.0	22.7	26.4	136	40.2	44.4	48.6	181	59.5	64.2	69.0	226	74.9	80.2	85.5	271	84.5	90.3	96.1
92	19.5	23.2	26.9	137	40.6	44.8	49.0	182	59.9	64.6	69.4	227	75.2	80.5	85.8	272	84.6	90.5	96.3
93	20.0	23.7	27.4	138	41.1	45.3	49.5	183	60.3	65.0	69.8	228	75.5	80.8	86.1	273	84.8	90.6	96.5
94	20.5	24.2	27.9	139	41.5	45.7	50.0	184	60.6	65.4	70.2	229	75.7	81.1	86.4	274	84.9	90.7	96.6
95	20.9	24.6	28.4	140	42.0	46.2	50.5	185	61.0	65.8	70.6	230	76.0	81.4	86.7	275	85.0	90.9	96.7
96	21.4	25.1	28.9	141	42.5	46.7	51.0	186	61.4	66.2	71.0	231	76.3	81.7	87.0	276	85.1	91.0	96.9
97	21.9	25.6	29.4	142	42.9	47.1	51.4	187	61.8	66.6	71.5	232	76.6	82.0	87.3	277	85.2	91.1	97.0
98	22.4	26.1	29.9	143	43.4	47.6	51.9	188	62.1	67.0	71.9	233	76.8	82.2	87.6	278	85.3	91.2	97.1
99	22.8	26.6	30.4	144	43.8	48.1	52.4	189	62.5	67.4	72.3	234	77.1	82.5	87.9	279	85.5	91.4	97.3
100	23.3	27.1	30.9	145	44.3	48.6	52.9	190	62.9	67.8	72.7	235	77.3	82.8	88.2	280	85.6	91.5	97.4
101	23.8	27.6	31.4	146	44.7	49.0	53.4	191	63.3	68.2	73.0	236	77.6	83.1	88.4	281	85.7	91.6	97.5
102	24.3	28.0	31.9	147	45.2	49.5	53.9	192	63.7	68.6	73.4	237	77.9	83.3	88.7	282	85.7	91.7	97.6
103	24.7	28.5	32.4	148	45.6	49.9	54.3	193	64.0	68.9	73.8	238	78.1	83.6	89.0	283	85.8	91.8	97.8
104	25.2	29.0	32.9	149	46.0	50.4	54.8	194	64.4	69.3	74.2	239	78.4	83.8	89.3	284	85.9	91.9	97.9
105	25.7	29.5	33.4	150	46.4	50.8	55.2	195	64.8	69.7	74.6	240	78.6	84.1	89.5	285	86.0	92.0	98.0
106	26.2	30.0	33.9	151	46.9	51.3	55.7	196	65.2	70.1	75.0	241	78.9	84.3	89.8	286	86.0	92.1	98.1
107	26.6	30.5	34.4	152	47.3	51.7	56.1	197	65.5	70.5	75.4	242	79.1	84.6	90.1	287	86.1	92.2	98.2
108	27.1	31.0	34.9	153	47.7	52.2	56.6	198	65.8	70.8	75.7	243	79.3	84.8	90.3	288	86.2	92.3	98.3
109	27.6	31.4	35.4	154	48.2	52.6	57.0	199	66.2	71.2	76.1	244	79.6	85.1	90.6	289	86.2	92.3	98.3
110	28.1	31.9	35.9	155	48.6	53.0	57.5	200	66.5	71.5	76.5	245	79.8	85.3	90.9	290	86.3	92.4	98.4
111	28.5	32.4	36.4	156	49.0	53.5	58.0	201	66.9	71.9	76.9	246	80.0	85.5	91.1	291	86.4	92.4	98.5
112	29.0	32.9	36.9	157	49.5	53.9	58.4	202	67.2	72.2	77.2	247	80.2	85.8	91.3	292	86.4	92.5	98.5
113	29.5	33.4	37.4	158	49.9	54.4	58.9	203	67.6	72.6	77.6	248	80.4	86.0	91.6	293	86.5	92.5	98.6
114	29.9	33.9	37.9	159	50.3	54.8	59.3	204	67.9	73.0	78.0	249	80.7	86.2	91.8	294	86.5	92.6	98.7

Biparietal Diameter, ASUM

Westerway SC. "Ultrasonic Fetal Measurements: New Australian Standards for the New Millennium." *Aust NZ J Obstet Gynaecol* 40:3:297-302, 2000.

BPD Days	5%	mean mm	95%	BPD Days	5%	mean mm	95%	BPD Days	5%	mean mm	95%	BPD Days	5%	mean mm	95%	BPD Days	5%	mean mm	95%
77	14.4	16.0	17.6	120	35.4	39.4	43.4	163	53.5	57.9	62.2	206	72.1	75.4	78.7	249	84.0	89.1	94.3
78	14.7	16.6	18.5	121	36.0	39.9	43.7	164	53.8	58.3	62.8	207	72.3	75.6	78.9	250	84.4	89.4	94.5
79	15.0	17.1	19.3	122	36.5	40.3	44.0	165	54.1	58.7	63.3	208	72.4	75.7	79.0	251	84.7	89.7	94.7
80	15.4	17.7	20.1	123	37.1	40.7	44.4	166	54.4	59.1	63.8	209	72.6	75.9	79.1	252	85.1	90.0	94.9
81	15.7	18.3	20.9	124	37.6	41.1	44.7	167	54.8	59.6	64.4	210	72.7	76.0	79.3	253	85.3	90.3	95.3
82	16.0	18.9	21.7	125	38.2	41.6	45.0	168	55.1	60.0	64.9	211	73.0	76.6	80.1	254	85.5	90.6	95.6
83	16.4	19.4	22.5	126	38.7	42.0	45.3	169	55.6	60.6	65.5	212	73.4	77.1	80.9	255	85.7	90.9	96.0
84	16.7	20.0	23.3	127	39.0	42.4	45.8	170	56.2	61.1	66.1	213	73.7	77.7	81.7	256	86.0	91.1	96.3
85	17.3	20.6	23.9	128	39.3	42.9	46.4	171	56.8	61.7	66.6	214	74.1	78.3	82.5	257	86.2	91.4	96.7
86	17.9	21.1	24.4	129	39.6	43.3	46.9	172	57.4	62.3	67.2	215	74.4	78.9	83.3	258	86.4	91.7	97.0
87	18.4	21.7	25.0	130	40.0	43.7	47.5	173	57.9	62.9	67.8	216	74.7	79.4	84.1	259	86.7	92.0	97.3
88	19.0	22.3	25.6	131	40.3	44.1	48.0	174	58.5	63.4	68.4	217	75.1	80.0	84.9	260	86.9	92.1	97.4
89	19.6	22.9	26.1	132	40.6	44.6	48.6	175	59.1	64.0	68.9	218	75.4	80.1	84.8	261	87.1	92.3	97.5
90	20.1	23.4	26.7	133	40.9	45.0	49.1	176	59.7	64.4	69.1	219	75.8	80.3	84.8	262	87.3	92.4	97.6
91	20.7	24.0	27.3	134	41.3	45.3	49.3	177	60.4	64.9	69.3	220	76.2	80.4	84.7	263	87.5	92.6	97.7
92	21.3	24.6	27.9	135	41.7	45.6	49.4	178	61.1	65.3	69.5	221	76.6	80.6	84.6	264	87.7	92.7	97.8
93	21.9	25.1	28.4	136	42.1	45.9	49.6	179	61.7	65.7	69.7	222	77.0	80.7	84.5	265	87.9	92.9	97.9
94	22.4	25.7	29.0	137	42.5	46.1	49.8	180	62.4	66.1	69.9	223	77.3	80.9	84.4	266	88.1	93.0	97.9
95	23.0	26.3	29.6	138	42.9	46.4	50.0	181	63.0	66.6	70.1	224	77.7	81.0	84.3	267	88.1	93.3	98.5
96	23.6	26.9	30.1	139	43.3	46.7	50.1	182	63.7	67.0	70.3	225	77.9	81.4	85.0	268	88.2	93.6	99.0
97	24.1	27.4	30.7	140	43.7	47.0	50.3	183	63.7	67.1	70.6	226	78.1	81.9	85.6	269	88.2	93.9	99.5
98	24.7	28.0	31.3	141	44.0	47.3	50.6	184	63.8	67.3	70.8	227	78.3	82.3	86.3	270	88.3	94.1	100.0
99	25.1	28.4	31.7	142	44.3	47.6	50.9	185	63.8	67.4	71.1	228	78.5	82.7	86.9	271	88.3	94.4	100.5
100	25.6	28.9	32.1	143	44.6	47.9	51.1	186	63.8	67.6	71.3	229	78.7	83.1	87.6	272	88.4	94.7	101.1
101	26.0	29.3	32.6	144	44.9	48.1	51.4	187	63.8	67.7	71.6	230	78.9	83.6	88.3	273	88.4	95.0	101.6
102	26.4	29.7	33.0	145	45.1	48.4	51.7	188	63.9	67.9	71.9	231	79.1	84.0	88.9	274	88.6	95.1	101.7
103	26.9	30.1	33.4	146	45.4	48.7	52.0	189	63.9	68.0	72.1	232	79.4	84.3	89.2	275	88.7	95.3	101.9
104	27.3	30.6	33.9	147	45.7	49.0	52.3	190	64.6	68.6	72.6	233	79.6	84.6	89.5	276	88.8	95.4	102.0
105	27.7	31.0	34.3	148	46.0	49.4	52.8	191	65.3	69.1	73.0	234	79.9	84.9	89.8	277	89.0	95.6	102.2
106	28.3	31.7	35.1	149	46.3	49.9	53.4	192	66.0	69.7	73.5	235	80.2	85.1	90.1	278	89.1	95.7	102.3
107	28.9	32.4	36.0	150	46.6	50.3	53.9	193	66.6	70.3	73.9	236	80.5	85.4	90.4	279	89.3	95.9	102.4
108	29.5	33.1	36.8	151	47.0	50.7	54.5	194	67.3	70.9	74.4	237	80.8	85.7	90.6	280	89.4	96.0	102.6
109	30.1	33.9	37.6	152	47.3	51.1	55.0	195	68.0	71.4	74.8	238	81.1	86.0	90.9	281	89.7	96.3	102.9
110	30.7	34.6	38.4	153	47.6	51.6	55.6	196	68.7	72.0	75.3	239	81.3	86.3	91.3	282	90.0	96.6	103.2
111	31.3	35.3	39.3	154	47.9	52.0	56.1	197	69.1	72.4	75.7	240	81.5	86.6	91.6	283	90.3	96.9	103.4
112	31.9	36.0	40.1	155	48.6	52.7	56.8	198	69.6	72.9	76.1	241	81.7	86.9	92.0	284	90.6	97.1	103.7
113	32.3	36.4	40.5	156	49.3	53.4	57.5	199	70.0	73.3	76.6	242	82.0	87.1	92.3	285	90.8	97.4	104.0
114	32.7	36.9	41.0	157	50.0	54.1	58.3	200	70.4	73.7	77.0	243	82.2	87.4	92.7	286	91.1	97.7	104.3
115	33.2	37.3	41.4	158	50.7	54.9	59.0	201	70.9	74.1	77.4	244	82.4	87.7	93.0	287	91.4	98.0	104.6
116	33.6	37.7	41.8	159	51.5	55.6	59.7	202	71.3	74.6	77.9	245	82.7	88.0	93.3				
117	34.0	38.1	42.3	160	52.2	56.3	60.4	203	71.7	75.0	78.3	246	83.0	88.3	93.6				
118	34.5	38.6	42.7	161	52.9	57.0	61.1	204	71.9	75.1	78.4	247	83.3	88.6	93.8				
119	34.9	39.0	43.1	162	53.2	57.4	61.7	205	72.0	75.3	78.6	248	83.7	88.9	94.0				

Biparietal Diameter (Outer to Inner), Chitty

Chitty, LS, Altman, DG, "Charts of Fetal Size: 2. Head Measurements," *British Journal of Obstetrics & Gynaecology* 101:35-43, 1994.

BPD (O-I) Days	5%	mean mm	95%	BPD (O-I) Days	5%	mean mm	95%	BPD (O-I) Days	5%	mean mm	95%	BPD (O-I) Days	5%	mean mm	95%	BPD (O-I) Days	5%	mean mm	95%
84	14.9	18.3	21.7	127	36.2	40.3	44.4	170	55.3	60.0	64.8	213	71.3	76.7	82.2	256	83.5	89.6	95.8
85	15.4	18.8	22.2	128	36.7	40.8	44.9	171	55.7	60.5	65.2	214	71.6	77.1	82.6	257	83.7	89.9	96.0
86	15.9	19.3	22.8	129	37.2	41.3	45.4	172	56.1	60.9	65.7	215	71.9	77.4	82.9	258	83.9	90.1	96.3
87	16.5	19.9	23.3	130	37.6	41.8	45.9	173	56.5	61.3	66.1	216	72.3	77.8	83.3	259	84.1	90.3	96.5
88	17.0	20.4	23.8	131	38.1	42.2	46.4	174	56.9	61.7	66.6	217	72.6	78.1	83.6	260	84.4	90.6	96.8
89	17.5	20.9	24.4	132	38.6	42.7	46.9	175	57.3	62.2	67.0	218	72.9	78.4	84.0	261	84.6	90.8	97.1
90	18.0	21.5	24.9	133	39.0	43.2	47.4	176	57.7	62.6	67.4	219	73.2	78.8	84.3	262	84.8	91.1	97.3
91	18.5	22.0	25.5	134	39.5	43.7	47.9	177	58.1	63.0	67.9	220	73.5	79.1	84.7	263	85.0	91.3	97.6
92	19.0	22.5	26.0	135	40.0	44.2	48.4	178	58.5	63.4	68.3	221	73.9	79.4	85.0	264	85.2	91.5	97.8
93	19.5	23.0	26.6	136	40.4	44.6	48.9	179	58.9	63.8	68.7	222	74.2	79.8	85.4	265	85.4	91.7	98.0
94	20.0	23.6	27.1	137	40.9	45.1	49.4	180	59.3	64.2	69.2	223	74.5	80.1	85.7	266	85.7	92.0	98.3
95	20.5	24.1	27.6	138	41.4	45.6	49.8	181	59.7	64.6	69.6	224	74.8	80.4	86.1	267	85.9	92.2	98.5
96	21.0	24.6	28.2	139	41.8	46.1	50.3	182	60.1	65.0	70.0	225	75.1	80.7	86.4	268	86.1	92.4	98.8
97	21.6	25.1	28.7	140	42.3	46.5	50.8	183	60.5	65.4	70.4	226	75.4	81.1	86.7	269	86.3	92.6	99.0
98	22.1	25.7	29.3	141	42.7	47.0	51.3	184	60.9	65.8	70.8	227	75.7	81.4	87.1	270	86.5	92.8	99.2
99	22.6	26.2	29.8	142	43.2	47.5	51.8	185	61.2	66.3	71.3	228	76.0	81.7	87.4	271	86.7	93.1	99.5
100	23.1	26.7	30.3	143	43.6	48.0	52.3	186	61.6	66.6	71.7	229	76.3	82.0	87.7	272	86.9	93.3	99.7
101	23.6	27.2	30.9	144	44.1	48.4	52.8	187	62.0	67.0	72.1	230	76.6	82.3	88.1	273	87.0	93.5	99.9
102	24.1	27.7	31.4	145	44.5	48.9	53.2	188	62.4	67.4	72.5	231	76.9	82.6	88.4	274	87.2	93.7	100.1
103	24.6	28.2	31.9	146	45.0	49.4	53.7	189	62.8	67.8	72.9	232	77.2	82.9	88.7	275	87.4	93.9	100.3
104	25.1	28.8	32.5	147	45.4	49.8	54.2	190	63.1	68.2	73.3	233	77.5	83.2	89.0	276	87.6	94.1	100.6
105	25.6	29.3	33.0	148	45.9	50.3	54.7	191	63.5	68.6	73.7	234	77.7	83.5	89.3	277	87.8	94.3	100.8
106	26.1	29.8	33.5	149	46.3	50.7	55.2	192	63.9	69.0	74.1	235	78.0	83.8	89.7	278	88.0	94.5	101.0
107	26.6	30.3	34.0	150	46.8	51.2	55.6	193	64.3	69.4	74.5	236	78.3	84.1	90.0	279	88.1	94.7	101.2
108	27.0	30.8	34.6	151	47.2	51.6	56.1	194	64.6	69.8	74.9	237	78.6	84.4	90.3	280	88.3	94.8	101.4
109	27.5	31.3	35.1	152	47.6	52.1	56.6	195	65.0	70.2	75.3	238	78.9	84.7	90.6	281	88.5	95.0	101.6
110	28.0	31.8	35.6	153	48.1	52.6	57.0	196	65.4	70.5	75.7	239	79.1	85.0	90.9	282	88.6	95.2	101.8
111	28.5	32.3	36.1	154	48.5	53.0	57.5	197	65.7	70.9	76.1	240	79.4	85.3	91.2	283	88.8	95.4	102.0
112	29.0	32.8	36.7	155	48.9	53.5	58.0	198	66.1	71.3	76.5	241	79.7	85.6	91.5	284	89.0	95.6	102.2
113	29.5	33.3	37.2	156	49.4	53.9	58.5	199	66.4	71.7	76.9	242	80.0	85.9	91.8	285	89.1	95.7	102.4
114	30.0	33.9	37.7	157	49.8	54.4	58.9	200	66.8	72.1	77.3	243	80.2	86.2	92.1	286	89.3	95.9	102.6
115	30.5	34.4	38.2	158	50.2	54.8	59.4	201	67.2	72.4	77.7	244	80.5	86.4	92.4	287	89.4	96.1	102.7
116	31.0	34.9	38.7	159	50.7	55.3	59.8	202	67.5	72.8	78.1	245	80.7	86.7	92.7	288	89.6	96.3	102.9
117	31.4	35.4	39.3	160	51.1	55.7	60.3	203	67.9	73.2	78.5	246	81.0	87.0	93.0	289	89.7	96.4	103.1
118	31.9	35.9	39.8	161	51.5	56.1	60.8	204	68.2	73.5	78.8	247	81.3	87.3	93.3	290	89.9	96.6	103.3
119	32.4	36.4	40.3	162	51.9	56.6	61.2	205	68.6	73.9	79.2	248	81.5	87.5	93.6	291	90.0	96.7	103.5
120	32.9	36.9	40.8	163	52.4	57.0	61.7	206	68.9	74.3	79.6	249	81.8	87.8	93.8	292	90.1	96.9	103.6
121	33.4	37.3	41.3	164	52.8	57.5	62.1	207	69.3	74.6	80.0	250	82.0	88.1	94.1	293	90.3	97.0	103.8
122	33.9	37.8	41.8	165	53.2	57.9	62.6	208	69.6	75.0	80.4	251	82.3	88.3	94.4	294	90.4	97.2	104.0
123	34.3	38.3	42.3	166	53.6	58.3	63.0	209	69.9	75.3	80.7	252	82.5	88.6	94.7				
124	34.8	38.8	42.9	167	54.0	58.8	63.5	210	70.3	75.7	81.1	253	82.7	88.8	95.0				
125	35.3	39.3	43.4	168	54.5	59.2	63.9	211	70.6	76.0	81.5	254	83.0	89.1	95.2				
126	35.8	39.8	43.9	169	54.9	59.6	64.4	212	70.9	76.4	81.8	255	83.2	89.4	95.5				

Biparietal Diameter (Outer to Outer), Chitty

Chitty, LS, Altman, DG, "Charts of Fetal Size: 2. Head Measurements," *British Journal of Obstetrics & Gynaecology* 101:35-43, 1994.

BPD (O-O) Days	5%	mean mm	95%	BPD (O-O) Days	5%	mean mm	95%	BPD (O-O) Days	5%	mean mm	95%	BPD (O-O) Days	5%	mean mm	95%	BPD (O-O) Days	5%	mean mm	95%
84	16.0	19.7	23.4	127	38.1	42.4	46.7	170	57.8	62.7	67.5	213	74.2	79.6	85.1	256	86.4	92.4	98.5
85	16.6	20.2	23.9	128	38.6	42.9	47.2	171	58.2	63.1	68.0	214	74.5	80.0	85.4	257	86.6	92.7	98.7
86	17.1	20.8	24.5	129	39.1	43.4	47.7	172	58.6	63.5	68.4	215	74.8	80.3	85.8	258	86.9	92.9	99.0
87	17.6	21.3	25.1	130	39.6	43.9	48.2	173	59.1	64.0	68.8	216	75.2	80.6	86.1	259	87.1	93.2	99.3
88	18.2	21.9	25.6	131	40.1	44.4	48.7	174	59.5	64.4	69.3	217	75.5	81.0	86.5	260	87.3	93.4	99.5
89	18.7	22.4	26.2	132	40.6	44.9	49.2	175	59.9	64.8	69.7	218	75.8	81.3	86.9	261	87.5	93.6	99.7
90	19.2	23.0	26.7	133	41.0	45.4	49.7	176	60.3	65.2	70.2	219	76.1	81.7	87.2	262	87.7	93.9	100.0
91	19.8	23.5	27.3	134	41.5	45.9	50.2	177	60.7	65.7	70.6	220	76.5	82.0	87.6	263	87.9	94.1	100.2
92	20.3	24.1	27.8	135	42.0	46.4	50.8	178	61.1	66.1	71.0	221	76.8	82.3	87.9	264	88.2	94.3	100.5
93	20.8	24.6	28.4	136	42.5	46.9	51.3	179	61.5	66.5	71.5	222	77.1	82.7	88.2	265	88.4	94.5	100.7
94	21.3	25.2	29.0	137	43.0	47.4	51.8	180	61.9	66.9	71.9	223	77.4	83.0	88.6	266	88.6	94.7	100.9
95	21.9	25.7	29.5	138	43.4	47.8	52.3	181	62.3	67.3	72.3	224	77.7	83.3	88.9	267	88.8	95.0	101.2
96	22.4	26.2	30.1	139	43.9	48.3	52.8	182	62.7	67.8	72.8	225	78.0	83.6	89.3	268	89.0	95.2	101.4
97	22.9	26.8	30.6	140	44.4	48.8	53.3	183	63.1	68.2	73.2	226	78.3	84.0	89.6	269	89.2	95.4	101.6
98	23.4	27.3	31.2	141	44.9	49.3	53.8	184	63.5	68.6	73.6	227	78.6	84.3	89.9	270	89.4	95.6	101.8
99	24.0	27.8	31.7	142	45.3	49.8	54.3	185	63.9	69.0	74.0	228	78.9	84.6	90.3	271	89.5	95.8	102.1
100	24.5	28.4	32.3	143	45.8	50.3	54.8	186	64.3	69.4	74.5	229	79.2	84.9	90.6	272	89.7	96.0	102.3
101	25.0	28.9	32.8	144	46.3	50.7	55.2	187	64.7	69.8	74.9	230	79.5	85.2	90.9	273	89.9	96.2	102.5
102	25.5	29.4	33.4	145	46.7	51.2	55.7	188	65.1	70.2	75.3	231	79.8	85.5	91.2	274	90.1	96.4	102.7
103	26.0	30.0	33.9	146	47.2	51.7	56.2	189	65.5	70.6	75.7	232	80.1	85.8	91.6	275	90.3	96.6	102.9
104	26.6	30.5	34.5	147	47.6	52.2	56.7	190	65.9	71.0	76.1	233	80.4	86.1	91.9	276	90.5	96.8	103.1
105	27.1	31.0	35.0	148	48.1	52.7	57.2	191	66.2	71.4	76.5	234	80.7	86.4	92.2	277	90.6	97.0	103.3
106	27.6	31.6	35.5	149	48.6	53.1	57.7	192	66.6	71.8	77.0	235	81.0	86.7	92.5	278	90.8	97.1	103.5
107	28.1	32.1	36.1	150	49.0	53.6	58.2	193	67.0	72.2	77.4	236	81.3	87.0	92.8	279	91.0	97.3	103.7
108	28.6	32.6	36.6	151	49.5	54.1	58.7	194	67.4	72.6	77.8	237	81.6	87.3	93.1	280	91.1	97.5	103.9
109	29.1	33.1	37.2	152	49.9	54.5	59.1	195	67.8	73.0	78.2	238	81.8	87.6	93.4	281	91.3	97.7	104.1
110	29.6	33.7	37.7	153	50.4	55.0	59.6	196	68.1	73.4	78.6	239	82.1	87.9	93.7	282	91.4	97.9	104.3
111	30.2	34.2	38.2	154	50.8	55.5	60.1	197	68.5	73.7	79.0	240	82.4	88.2	94.0	283	91.6	98.0	104.4
112	30.7	34.7	38.8	155	51.3	55.9	60.6	198	68.9	74.1	79.4	241	82.6	88.5	94.3	284	91.8	98.2	104.6
113	31.2	35.2	39.3	156	51.7	56.4	61.0	199	69.2	74.5	79.8	242	82.9	88.8	94.6	285	91.9	98.4	104.8
114	31.7	35.8	39.8	157	52.2	56.8	61.5	200	69.6	74.9	80.2	243	83.2	89.0	94.9	286	92.1	98.5	105.0
115	32.2	36.3	40.4	158	52.6	57.3	62.0	201	70.0	75.3	80.5	244	83.4	89.3	95.2	287	92.2	98.7	105.1
116	32.7	36.8	40.9	159	53.0	57.8	62.5	202	70.3	75.6	80.9	245	83.7	89.6	95.5	288	92.3	98.8	105.3
117	33.2	37.3	41.4	160	53.5	58.2	62.9	203	70.7	76.0	81.3	246	84.0	89.9	95.8	289	92.5	99.0	105.5
118	33.7	37.8	42.0	161	53.9	58.7	63.4	204	71.0	76.4	81.7	247	84.2	90.1	96.1	290	92.6	99.1	105.6
119	34.2	38.3	42.5	162	54.4	59.1	63.9	205	71.4	76.7	82.1	248	84.5	90.4	96.3	291	92.7	99.3	105.8
120	34.7	38.9	43.0	163	54.8	59.6	64.3	206	71.8	77.1	82.5	249	84.7	90.7	96.6	292	92.9	99.4	106.0
121	35.2	39.4	43.5	164	55.2	60.0	64.8	207	72.1	77.5	82.8	250	85.0	90.9	96.9	293	93.0	99.6	106.1
122	35.7	39.9	44.1	165	55.7	60.5	65.2	208	72.5	77.8	83.2	251	85.2	91.2	97.2	294	93.1	99.7	106.3
123	36.2	40.4	44.6	166	56.1	60.9	65.7	209	72.8	78.2	83.6	252	85.5	91.4	97.4				
124	36.7	40.9	45.1	167	56.5	61.3	66.2	210	73.1	78.6	84.0	253	85.7	91.7	97.7				
125	37.2	41.4	45.6	168	56.9	61.8	66.6	211	73.5	78.9	84.3	254	85.9	92.0	98.0				
126	37.7	41.9	46.1	169	57.4	62.2	67.1	212	73.8	79.3	84.7	255	86.2	92.2	98.2				

Occipital Frontal Diameter, Hansmann

Hansmann M, Hackelöer B-J, Staudach A. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, 1985, p. 176.

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
10	0	7.0	14.0	21.0	16	1	33.6	40.6	47.6	22	2	59.1	66.1	73.1	28	3	81.3	88.3	95.3	34	4	98.1	105.1	112.1
10	1	7.6	14.6	21.6	16	2	34.1	41.1	48.1	22	3	59.7	66.7	73.7	28	4	81.7	88.7	95.7	34	5	98.4	105.4	112.4
10	2	8.1	15.1	22.1	16	3	34.7	41.7	48.7	22	4	60.3	67.3	74.3	28	5	82.1	89.1	96.1	34	6	98.7	105.7	112.7
10	3	8.7	15.7	22.7	16	4	35.3	42.3	49.3	22	5	60.9	67.9	74.9	28	6	82.6	89.6	96.6	35	0	99.0	106.0	113.0
10	4	9.3	16.3	23.3	16	5	35.9	42.9	49.9	22	6	61.4	68.4	75.4	29	0	83.0	90.0	97.0	35	1	99.4	106.4	113.4
10	5	9.9	16.9	23.9	16	6	36.4	43.4	50.4	23	0	62.0	69.0	76.0	29	1	83.4	90.4	97.4	35	2	99.9	106.9	113.9
10	6	10.4	17.4	24.4	17	0	37.0	44.0	51.0	23	1	62.4	69.4	76.4	29	2	83.9	90.9	97.9	35	3	100.3	107.3	114.3
11	0	11.0	18.0	25.0	17	1	37.6	44.6	51.6	23	2	62.9	69.9	76.9	29	3	84.3	91.3	98.3	35	4	100.7	107.7	114.7
11	1	11.7	18.7	25.7	17	2	38.1	45.1	52.1	23	3	63.3	70.3	77.3	29	4	84.7	91.7	98.7	35	5	101.1	108.1	115.1
11	2	12.4	19.4	26.4	17	3	38.7	45.7	52.7	23	4	63.7	70.7	77.7	29	5	85.1	92.1	99.1	35	6	101.6	108.6	115.6
11	3	13.1	20.1	27.1	17	4	39.3	46.3	53.3	23	5	64.1	71.1	78.1	29	6	85.6	92.6	99.6	36	0	102.0	109.0	116.0
11	4	13.9	20.9	27.9	17	5	39.9	46.9	53.9	23	6	64.6	71.6	78.6	30	0	86.0	93.0	100.0	36	1	102.3	109.3	116.3
11	5	14.6	21.6	28.6	17	6	40.4	47.4	54.4	24	0	65.0	72.0	79.0	30	1	86.4	93.4	100.4	36	2	102.6	109.6	116.6
11	6	15.3	22.3	29.3	18	0	41.0	48.0	55.0	24	1	65.6	72.6	79.6	30	2	86.9	93.9	100.9	36	3	102.9	109.9	116.9
12	0	16.0	23.0	30.0	18	1	41.7	48.7	55.7	24	2	66.1	73.1	80.1	30	3	87.3	94.3	101.3	36	4	103.1	110.1	117.1
12	1	16.6	23.6	30.6	18	2	42.4	49.4	56.4	24	3	66.7	73.7	80.7	30	4	87.7	94.7	101.7	36	5	103.4	110.4	117.4
12	2	17.1	24.1	31.1	18	3	43.1	50.1	57.1	24	4	67.3	74.3	81.3	30	5	88.1	95.1	102.1	36	6	103.7	110.7	117.7
12	3	17.7	24.7	31.7	18	4	43.9	50.9	57.9	24	5	67.9	74.9	81.9	30	6	88.6	95.6	102.6	37	0	104.0	111.0	118.0
12	4	18.3	25.3	32.3	18	5	44.6	51.6	58.6	24	6	68.4	75.4	82.4	31	0	89.0	96.0	103.0	37	1	104.1	111.1	118.1
12	5	18.9	25.9	32.9	18	6	45.3	52.3	59.3	25	0	69.0	76.0	83.0	31	1	89.4	96.4	103.4	37	2	104.3	111.3	118.3
12	6	19.4	26.4	33.4	19	0	46.0	53.0	60.0	25	1	69.6	76.6	83.6	31	2	89.9	96.9	103.9	37	3	104.4	111.4	118.4
13	0	20.0	27.0	34.0	19	1	46.6	53.6	60.6	25	2	70.1	77.1	84.1	31	3	90.3	97.3	104.3	37	4	104.6	111.6	118.6
13	1	20.6	27.6	34.6	19	2	47.1	54.1	61.1	25	3	70.7	77.7	84.7	31	4	90.7	97.7	104.7	37	5	104.7	111.7	118.7
13	2	21.1	28.1	35.1	19	3	47.7	54.7	61.7	25	4	71.3	78.3	85.3	31	5	91.1	98.1	105.1	37	6	104.9	111.9	118.9
13	3	21.7	28.7	35.7	19	4	48.3	55.3	62.3	25	5	71.9	78.9	85.9	31	6	91.6	98.6	105.6	38	0	105.0	112.0	119.0
13	4	22.3	29.3	36.3	19	5	48.9	55.9	62.9	25	6	72.4	79.4	86.4	32	0	92.0	99.0	106.0	38	1	105.3	112.3	119.3
13	5	22.9	29.9	36.9	19	6	49.4	56.4	63.4	26	0	73.0	80.0	87.0	32	1	92.4	99.4	106.3	38	2	105.6	112.6	119.6
13	6	23.4	30.4	37.4	20	0	50.0	57.0	64.0	26	1	73.4	80.4	87.4	32	2	92.9	99.9	106.6	38	3	105.9	112.9	119.9
14	0	24.0	31.0	38.0	20	1	50.6	57.6	64.6	26	2	73.9	80.9	87.9	32	3	93.3	100.3	106.9	38	4	106.1	113.1	120.1
14	1	24.7	31.7	38.7	20	2	51.1	58.1	65.1	26	3	74.3	81.3	88.3	32	4	93.7	100.7	107.1	38	5	106.4	113.4	120.4
14	2	25.4	32.4	39.4	20	3	51.7	58.7	65.7	26	4	74.7	81.7	88.7	32	5	94.1	101.1	107.4	38	6	106.7	113.7	120.7
14	3	26.1	33.1	40.1	20	4	52.3	59.3	66.3	26	5	75.1	82.1	89.1	32	6	94.6	101.6	107.7	39	0	107.0	114.0	121.0
14	4	26.9	33.9	40.9	20	5	52.9	59.9	66.9	26	6	75.6	82.6	89.6	33	0	95.0	102.0	108.0	39	1	107.1	114.1	121.1
14	5	27.6	34.6	41.6	20	6	53.4	60.4	67.4	27	0	76.0	83.0	90.0	33	1	95.3	102.3	108.4	39	2	107.3	114.3	121.3
14	6	28.3	35.3	42.3	21	0	54.0	61.0	68.0	27	1	76.6	83.6	90.6	33	2	95.6	102.6	108.9	39	3	107.4	114.4	121.4
15	0	29.0	36.0	43.0	21	1	54.6	61.6	68.6	27	2	77.1	84.1	91.1	33	3	95.9	102.9	109.3	39	4	107.6	114.6	121.6
15	1	29.6	36.6	43.6	21	2	55.1	62.1	69.1	27	3	77.7	84.7	91.7	33	4	96.1	103.1	109.7	39	5	107.7	114.7	121.7
15	2	30.1	37.1	44.1	21	3	55.7	62.7	69.7	27	4	78.3	85.3	92.3	33	5	96.4	103.4	110.1	39	6	107.9	114.9	121.9
15	3	30.7	37.7	44.7	21	4	56.3	63.3	70.3	27	5	78.9	85.9	92.9	33	6	96.7	103.7	110.6	40	0	108.0	115.0	122.0
15	4	31.3	38.3	45.3	21	5	56.9	63.9	70.9	27	6	79.4	86.4	93.4	34	0	97.0	104.0	111.0					
15	5	31.9	38.9	45.9	21	6	57.4	64.4	71.4	28	0	80.0	87.0	94.0	34	1	97.3	104.3	111.3					
15	6	32.4	39.4	46.4	22	0	58.0	65.0	72.0	28	1	80.4	87.4	94.4	34	2	97.6	104.6	111.6					
16	0	33.0	40.0	47.0	22	1	58.6	65.6	72.6	28	2	80.9	87.9	94.9	34	3	97.9	104.9	111.9					

Occipital Frontal Diameter, Chitty

Chitty, LS, Altman, DG, "Charts of Fetal Size: 2. Head Measurements," *British Journal of Obstetrics & Gynaecology* 101:35-43, 1994.

OFD Days	5%	mean mm	95%	OFD Days	5%	mean mm	95%	OFD Days	5%	mean mm	95%	OFD Days	5%	mean mm	95%	OFD Days	5%	mean mm	95%
84	18.4	23.4	28.5	127	48.7	53.7	58.6	170	74.5	80.1	85.8	213	94.3	101.5	108.8	256	106.9	116.7	126.4
85	19.1	24.2	29.2	128	49.4	54.3	59.2	171	75.0	80.7	86.3	214	94.7	102.0	109.3	257	107.1	116.9	126.8
86	19.9	24.9	29.9	129	50.1	55.0	59.9	172	75.5	81.2	86.9	215	95.0	102.4	109.8	258	107.3	117.2	127.1
87	20.6	25.6	30.7	130	50.7	55.6	60.6	173	76.1	81.8	87.5	216	95.4	102.8	110.2	259	107.5	117.5	127.4
88	21.4	26.4	31.4	131	51.3	56.3	61.2	174	76.6	82.3	88.1	217	95.8	103.2	110.7	260	107.7	117.7	127.7
89	22.1	27.1	32.1	132	52.0	56.9	61.9	175	77.1	82.9	88.7	218	96.2	103.7	111.2	261	107.9	118.0	128.1
90	22.8	27.8	32.8	133	52.6	57.6	62.6	176	77.6	83.4	89.3	219	96.5	104.1	111.6	262	108.1	118.2	128.4
91	23.6	28.6	33.5	134	53.3	58.3	63.2	177	78.1	84.0	89.8	220	96.9	104.5	112.1	263	108.2	118.5	128.7
92	24.3	29.3	34.3	135	53.9	58.9	63.9	178	78.6	84.5	90.4	221	97.2	104.9	112.5	264	108.4	118.7	129.0
93	25.1	30.0	35.0	136	54.6	59.5	64.5	179	79.1	85.1	91.0	222	97.6	105.3	113.0	265	108.5	118.9	129.3
94	25.8	30.7	35.7	137	55.2	60.2	65.2	180	79.7	85.6	91.5	223	97.9	105.7	113.4	266	108.7	119.2	129.6
95	26.5	31.5	36.4	138	55.8	60.8	65.8	181	80.2	86.1	92.1	224	98.3	106.1	113.9	267	108.9	119.4	129.9
96	27.2	32.2	37.1	139	56.4	61.5	66.5	182	80.6	86.7	92.7	225	98.6	106.5	114.3	268	109.0	119.6	130.2
97	28.0	32.9	37.8	140	57.1	62.1	67.1	183	81.1	87.2	93.2	226	98.9	106.8	114.8	269	109.1	119.8	130.5
98	28.7	33.6	38.5	141	57.7	62.7	67.8	184	81.6	87.7	93.8	227	99.3	107.2	115.2	270	109.3	120.0	130.8
99	29.4	34.3	39.2	142	58.3	63.4	68.4	185	82.1	88.2	94.3	228	99.6	107.6	115.6	271	109.4	120.2	131.1
100	30.1	35.0	39.9	143	58.9	64.0	69.1	186	82.6	88.7	94.9	229	99.9	108.0	116.1	272	109.5	120.4	131.3
101	30.9	35.8	40.6	144	59.5	64.6	69.7	187	83.1	89.3	95.4	230	100.2	108.4	116.5	273	109.7	120.6	131.6
102	31.6	36.5	41.4	145	60.1	65.3	70.4	188	83.6	89.8	96.0	231	100.5	108.7	116.9	274	109.8	120.8	131.9
103	32.3	37.2	42.1	146	60.8	65.9	71.0	189	84.0	90.3	96.5	232	100.8	109.1	117.3	275	109.9	121.0	132.2
104	33.0	37.9	42.8	147	61.4	66.5	71.6	190	84.5	90.8	97.1	233	101.1	109.4	117.8	276	110.0	121.2	132.4
105	33.7	38.6	43.5	148	62.0	67.1	72.3	191	85.0	91.3	97.6	234	101.4	109.8	118.2	277	110.1	121.4	132.7
106	34.4	39.3	44.2	149	62.6	67.7	72.9	192	85.4	91.8	98.1	235	101.7	110.2	118.6	278	110.2	121.6	132.9
107	35.1	40.0	44.9	150	63.2	68.4	73.5	193	85.9	92.3	98.7	236	102.0	110.5	119.0	279	110.3	121.7	133.2
108	35.8	40.7	45.6	151	63.8	69.0	74.2	194	86.3	92.8	99.2	237	102.3	110.9	119.4	280	110.4	121.9	133.4
109	36.5	41.4	46.3	152	64.3	69.6	74.8	195	86.8	93.3	99.7	238	102.6	111.2	119.8	281	110.5	122.1	133.7
110	37.2	42.1	47.0	153	64.9	70.2	75.4	196	87.2	93.8	100.3	239	102.9	111.5	120.2	282	110.6	122.2	133.9
111	37.9	42.8	47.6	154	65.5	70.8	76.1	197	87.7	94.2	100.8	240	103.1	111.9	120.6	283	110.6	122.4	134.2
112	38.6	43.5	48.3	155	66.1	71.4	76.7	198	88.1	94.7	101.3	241	103.4	112.2	121.0	284	110.7	122.5	134.4
113	39.3	44.2	49.0	156	66.7	72.0	77.3	199	88.6	95.2	101.8	242	103.7	112.5	121.4	285	110.8	122.7	134.6
114	40.0	44.9	49.7	157	67.3	72.6	77.9	200	89.0	95.7	102.3	243	103.9	112.8	121.7	286	110.8	122.8	134.8
115	40.7	45.5	50.4	158	67.8	73.2	78.5	201	89.4	96.1	102.9	244	104.2	113.2	122.1	287	110.9	123.0	135.1
116	41.4	46.2	51.1	159	68.4	73.8	79.1	202	89.8	96.6	103.4	245	104.4	113.5	122.5	288	110.9	123.1	135.3
117	42.0	46.9	51.8	160	69.0	74.4	79.8	203	90.3	97.1	103.9	246	104.7	113.8	122.9	289	111.0	123.2	135.5
118	42.7	47.6	52.5	161	69.5	74.9	80.4	204	90.7	97.5	104.4	247	104.9	114.1	123.3	290	111.0	123.4	135.7
119	43.4	48.3	53.2	162	70.1	75.5	81.0	205	91.1	98.0	104.9	248	105.2	114.4	123.6	291	111.0	123.5	135.9
120	44.1	49.0	53.8	163	70.6	76.1	81.6	206	91.5	98.5	105.4	249	105.4	114.7	124.0	292	111.1	123.6	136.1
121	44.8	49.6	54.5	164	71.2	76.7	82.2	207	91.9	98.9	105.9	250	105.6	115.0	124.3	293	111.1	123.7	136.3
122	45.4	50.3	55.2	165	71.8	77.3	82.8	208	92.3	99.4	106.4	251	105.9	115.3	124.7	294	111.1	123.8	136.5
123	46.1	51.0	55.9	166	72.3	77.8	83.4	209	92.7	99.8	106.9	252	106.1	115.6	125.1				
124	46.8	51.7	56.5	167	72.8	78.4	84.0	210	93.1	100.2	107.4	253	106.3	115.9	125.4				
125	47.4	52.3	57.2	168	73.4	79.0	84.6	211	93.5	100.7	107.8	254	106.5	116.1	125.7				
126	48.1	53.0	57.9	169	73.9	79.5	85.2	212	93.9	101.1	108.3	255	106.7	116.4	126.1				

Occipital Frontal Diameter, ASUM

Westerway SC. "Ultrasonic Fetal Measurements: New Australian Standards for the New Millennium." *Aust NZ J Obstet Gynaecol* 40:3:297-302, 2000.

OFD Days	5%	mean mm	95%	OFD Days	5%	mean mm	95%	OFD Days	5%	mean mm	95%	OFD Days	5%	mean mm	95%	OFD Days	5%	mean mm	95%
77	19.4	21.0	22.6	120	48.0	50.6	53.1	163	73.6	76.9	80.1	206	92.9	97.4	102.0	249	106.2	110.7	115.2
78	19.8	21.4	23.1	121	48.6	51.1	53.7	164	74.0	77.3	80.6	207	93.0	97.6	102.1	250	106.6	111.1	115.7
79	20.2	21.9	23.5	122	49.1	51.7	54.4	165	74.4	77.7	81.0	208	93.2	97.7	102.2	251	107.0	111.6	116.1
80	20.6	22.3	23.9	123	49.6	52.3	55.0	166	74.9	78.1	81.4	209	93.3	97.9	102.4	252	107.5	112.0	116.5
81	21.1	22.7	24.4	124	50.1	52.9	55.6	167	75.3	78.6	81.9	210	93.5	98.0	102.5	253	107.6	112.1	116.7
82	21.5	23.1	24.8	125	50.6	53.4	56.2	168	75.7	79.0	82.3	211	94.0	98.4	102.9	254	107.6	112.3	116.9
83	21.9	23.6	25.2	126	51.1	54.0	56.9	169	76.1	79.4	82.8	212	94.5	98.9	103.3	255	107.7	112.4	117.1
84	22.4	24.0	25.6	127	51.5	54.4	57.3	170	76.4	79.9	83.3	213	94.9	99.3	103.6	256	107.8	112.6	117.3
85	23.0	24.7	26.5	128	52.0	54.9	57.7	171	76.8	80.3	83.8	214	95.4	99.7	104.0	257	107.9	112.7	117.5
86	23.5	25.4	27.3	129	52.4	55.3	58.2	172	77.2	80.7	84.2	215	95.9	100.1	104.4	258	108.0	112.9	117.7
87	24.1	26.1	28.1	130	52.8	55.7	58.6	173	77.6	81.1	84.7	216	96.4	100.6	104.7	259	108.1	113.0	117.9
88	24.7	26.9	29.0	131	53.3	56.1	59.0	174	77.9	81.6	85.2	217	96.9	101.0	105.1	260	108.6	113.4	118.3
89	25.3	27.6	29.8	132	53.7	56.6	59.5	175	78.3	82.0	85.7	218	97.0	101.1	105.3	261	109.0	113.9	118.7
90	25.9	28.3	30.6	133	54.1	57.0	59.9	176	78.6	82.3	86.0	219	97.2	101.3	105.4	262	109.5	114.3	119.0
91	26.5	29.0	31.5	134	54.7	57.6	60.5	177	78.9	82.6	86.3	220	97.3	101.4	105.5	263	110.0	114.7	119.4
92	27.2	29.7	32.2	135	55.3	58.1	61.0	178	79.2	82.9	86.6	221	97.5	101.6	105.7	264	110.5	115.1	119.8
93	28.0	30.4	32.9	136	55.8	58.7	61.6	179	79.4	83.1	86.8	222	97.6	101.7	105.8	265	111.0	115.6	120.2
94	28.7	31.1	33.6	137	56.4	59.3	62.2	180	79.7	83.4	87.1	223	97.7	101.9	106.0	266	111.5	116.0	120.5
95	29.4	31.9	34.3	138	57.0	59.9	62.7	181	80.0	83.7	87.4	224	97.9	102.0	106.1	267	111.8	116.4	121.0
96	30.1	32.6	35.0	139	57.5	60.4	63.3	182	80.3	84.0	87.7	225	98.5	102.7	106.9	268	112.2	116.9	121.5
97	30.8	33.3	35.8	140	58.1	61.0	63.9	183	80.6	84.3	88.0	226	99.2	103.4	107.7	269	112.6	117.3	122.0
98	31.5	34.0	36.5	141	58.3	61.3	64.2	184	80.9	84.6	88.3	227	99.9	104.1	108.4	270	113.0	117.7	122.5
99	32.1	34.6	37.0	142	58.6	61.6	64.6	185	81.2	84.9	88.6	228	100.5	104.9	109.2	271	113.3	118.1	123.0
100	32.7	35.1	37.6	143	58.8	61.9	64.9	186	81.4	85.1	88.8	229	101.2	105.6	110.0	272	113.7	118.6	123.4
101	33.2	35.7	38.2	144	59.0	62.1	65.3	187	81.7	85.4	89.1	230	101.8	106.3	110.8	273	114.1	119.0	123.9
102	33.8	36.3	38.8	145	59.3	62.4	65.6	188	82.0	85.7	89.4	231	102.5	107.0	111.5	274	114.2	119.1	124.1
103	34.4	36.9	39.3	146	59.5	62.7	65.9	189	82.3	86.0	89.7	232	102.6	107.1	111.7	275	114.4	119.3	124.2
104	35.0	37.4	39.9	147	59.7	63.0	66.3	190	83.5	87.3	91.0	233	102.8	107.3	111.8	276	114.5	119.4	124.4
105	35.5	38.0	40.5	148	60.5	63.7	66.9	191	84.8	88.6	92.4	234	102.9	107.4	112.0	277	114.6	119.6	124.5
106	36.7	39.1	41.6	149	61.3	64.4	67.6	192	86.0	89.9	93.7	235	103.0	107.6	112.1	278	114.8	119.7	124.6
107	37.8	40.3	42.8	150	62.0	65.1	68.3	193	87.2	91.1	95.1	236	103.2	107.7	112.2	279	114.9	119.9	124.8
108	39.0	41.4	43.9	151	62.8	65.9	68.9	194	88.4	92.4	96.4	237	103.3	107.9	112.4	280	115.1	120.0	124.9
109	40.1	42.6	45.0	152	63.6	66.6	69.6	195	89.7	93.7	97.8	238	103.5	108.0	112.5	281	115.4	120.3	125.2
110	41.2	43.7	46.2	153	64.3	67.3	70.2	196	90.9	95.0	99.1	239	103.6	108.1	112.7	282	115.6	120.6	125.5
111	42.4	44.9	47.3	154	65.1	68.0	70.9	197	91.1	95.3	99.5	240	103.8	108.3	112.8	283	115.9	120.9	125.8
112	43.5	46.0	48.5	155	66.2	69.1	72.1	198	91.3	95.6	99.8	241	103.9	108.4	113.0	284	116.2	121.1	126.1
113	44.1	46.6	49.0	156	67.3	70.3	73.3	199	91.6	95.9	100.1	242	104.0	108.6	113.1	285	116.5	121.4	126.4
114	44.7	47.1	49.6	157	68.4	71.4	74.5	200	91.8	96.1	100.5	243	104.2	108.7	113.2	286	116.8	121.7	126.6
115	45.2	47.7	50.2	158	69.5	72.6	75.7	201	92.0	96.4	100.8	244	104.3	108.9	113.4	287	117.1	122.0	126.9
116	45.8	48.3	50.8	159	70.5	73.7	76.9	202	92.2	96.7	101.2	245	104.5	109.0	113.5				
117	46.4	48.9	51.3	160	71.6	74.9	78.1	203	92.5	97.0	101.5	246	104.9	109.4	114.0				
118	47.0	49.4	51.9	161	72.7	76.0	79.3	204	92.6	97.1	101.7	247	105.3	109.9	114.4				
119	47.5	50.0	52.5	162	73.1	76.4	79.7	205	92.8	97.3	101.8	248	105.8	110.3	114.8				

Head Circumference, Hadlock

Hadlock FP, Deter RL, Harrist RB, Park SK. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters." *Radiology* 152:497, 1984.

HC(cm)= -11.48 + 1.56 * MA(wks) - 0.0002548 MA(wks)^3 Standard Deviation = 10 mm 5 & 95%: ±16.45 mm

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
12	0	51.5	68.0	84.4	18	1	136.6	153.0	169.5	24	2	211.1	227.6	244.0	30	3	271.6	288.1	304.5	36	4	314.6	331.1	347.5
12	1	53.6	70.1	86.5	18	2	138.4	154.9	171.3	24	3	212.7	229.1	245.6	30	4	272.9	289.3	305.8	36	5	315.4	331.8	348.3
12	2	55.7	72.1	88.6	18	3	140.3	156.7	173.2	24	4	214.3	230.7	247.2	30	5	274.1	290.5	307.0	36	6	316.1	332.6	349.0
12	3	57.7	74.2	90.6	18	4	142.1	158.6	175.0	24	5	215.8	232.3	248.7	30	6	275.3	291.7	308.2	37	0	316.9	333.3	349.8
12	4	59.8	76.3	92.7	18	5	144.0	160.4	176.9	24	6	217.4	233.8	250.3	31	0	276.4	292.9	309.3	37	1	317.6	334.1	350.5
12	5	61.9	78.3	94.8	18	6	145.8	162.3	178.7	25	0	218.9	235.4	251.8	31	1	277.6	294.1	310.5	37	2	318.3	334.8	351.2
12	6	63.9	80.4	96.8	19	0	147.7	164.1	180.6	25	1	220.5	236.9	253.4	31	2	278.8	295.2	311.7	37	3	319.0	335.5	351.9
13	0	66.0	82.4	98.9	19	1	149.5	166.0	182.4	25	2	222.0	238.5	254.9	31	3	279.9	296.4	312.8	37	4	319.7	336.2	352.6
13	1	68.0	84.4	100.9	19	2	151.3	167.8	184.2	25	3	223.5	240.0	256.4	31	4	281.1	297.5	314.0	37	5	320.4	336.9	353.3
13	2	70.0	86.5	102.9	19	3	153.1	169.6	186.0	25	4	225.1	241.5	258.0	31	5	282.2	298.7	315.1	37	6	321.1	337.5	354.0
13	3	72.1	88.5	105.0	19	4	155.0	171.4	187.9	25	5	226.6	243.0	259.5	31	6	283.3	299.8	316.2	38	0	321.7	338.2	354.6
13	4	74.1	90.5	107.0	19	5	156.8	173.2	189.7	25	6	228.1	244.5	261.0	32	0	284.5	300.9	317.4	38	1	322.4	338.8	355.3
13	5	76.1	92.6	109.0	19	6	158.6	175.0	191.5	26	0	229.6	246.0	262.5	32	1	285.6	302.0	318.5	38	2	323.0	339.5	355.9
13	6	78.1	94.6	111.0	20	0	160.4	176.8	193.3	26	1	231.1	247.5	264.0	32	2	286.7	303.1	319.6	38	3	323.6	340.1	356.5
14	0	80.2	96.6	113.1	20	1	162.2	178.6	195.1	26	2	232.5	249.0	265.4	32	3	287.7	304.2	320.6	38	4	324.2	340.7	357.1
14	1	82.2	98.6	115.1	20	2	163.9	180.4	196.8	26	3	234.0	250.5	266.9	32	4	288.8	305.3	321.7	38	5	324.8	341.3	357.7
14	2	84.2	100.6	117.1	20	3	165.7	182.2	198.6	26	4	235.5	251.9	268.4	32	5	289.9	306.3	322.8	38	6	325.4	341.9	358.3
14	3	86.2	102.6	119.1	20	4	167.5	183.9	200.4	26	5	236.9	253.4	269.8	32	6	290.9	307.4	323.8	39	0	326.0	342.5	358.9
14	4	88.2	104.6	121.1	20	5	169.2	185.7	202.1	26	6	238.4	254.8	271.3	33	0	292.0	308.4	324.9	39	1	326.6	343.0	359.5
14	5	90.2	106.6	123.1	20	6	171.0	187.5	203.9	27	0	239.8	256.2	272.7	33	1	293.0	309.5	325.9	39	2	327.1	343.6	360.0
14	6	92.2	108.6	125.1	21	0	172.8	189.2	205.7	27	1	241.2	257.7	274.1	33	2	294.0	310.5	326.9	39	3	327.7	344.1	360.6
15	0	94.2	110.6	127.1	21	1	174.5	190.9	207.4	27	2	242.6	259.1	275.5	33	3	295.1	311.5	328.0	39	4	328.2	344.6	361.1
15	1	96.1	112.6	129.0	21	2	176.2	192.7	209.1	27	3	244.1	260.5	277.0	33	4	296.1	312.5	329.0	39	5	328.7	345.1	361.6
15	2	98.1	114.6	131.0	21	3	178.0	194.4	210.9	27	4	245.5	261.9	278.4	33	5	297.0	313.5	329.9	39	6	329.2	345.6	362.1
15	3	100.1	116.5	133.0	21	4	179.7	196.1	212.6	27	5	246.9	263.3	279.8	33	6	298.0	314.5	330.9	40	0	329.7	346.1	362.6
15	4	102.0	118.5	134.9	21	5	181.4	197.9	214.3	27	6	248.2	264.7	281.1	34	0	299.0	315.5	331.9	40	1	330.2	346.6	363.1
15	5	104.0	120.5	136.9	21	6	183.1	199.6	216.0	28	0	249.6	266.1	282.5	34	1	300.0	316.4	332.9	40	2	330.6	347.1	363.5
15	6	106.0	122.4	138.9	22	0	184.8	201.3	217.7	28	1	251.0	267.4	283.9	34	2	300.9	317.4	333.8	40	3	331.1	347.5	364.0
16	0	107.9	124.4	140.8	22	1	186.5	203.0	219.4	28	2	252.3	268.8	285.2	34	3	301.9	318.3	334.8	40	4	331.5	348.0	364.4
16	1	109.9	126.3	142.8	22	2	188.2	204.7	221.1	28	3	253.7	270.1	286.6	34	4	302.8	319.2	335.7	40	5	331.9	348.4	364.8
16	2	111.8	128.3	144.7	22	3	189.9	206.3	222.8	28	4	255.0	271.5	287.9	34	5	303.7	320.2	336.6	40	6	332.3	348.8	365.2
16	3	113.7	130.2	146.6	22	4	191.6	208.0	224.5	28	5	256.4	272.8	289.3	34	6	304.6	321.1	337.5	41	0	332.7	349.2	365.6
16	4	115.7	132.1	148.6	22	5	193.2	209.7	226.1	28	6	257.7	274.1	290.6	35	0	305.5	322.0	338.4	41	1	333.1	349.6	366.0
16	5	117.6	134.0	150.5	22	6	194.9	211.3	227.8	29	0	259.0	275.5	291.9	35	1	306.4	322.8	339.3	41	2	333.5	349.9	366.4
16	6	119.5	136.0	152.4	23	0	196.5	213.0	229.4	29	1	260.3	276.8	293.2	35	2	307.3	323.7	340.2	41	3	333.9	350.3	366.8
17	0	121.4	137.9	154.3	23	1	198.2	214.6	231.1	29	2	261.6	278.1	294.5	35	3	308.1	324.6	341.0	41	4	334.2	350.7	367.1
17	1	123.3	139.8	156.2	23	2	199.8	216.3	232.7	29	3	262.9	279.3	295.8	35	4	309.0	325.4	341.9	41	5	334.5	351.0	367.4
17	2	125.2	141.7	158.1	23	3	201.5	217.9	234.4	29	4	264.2	280.6	297.1	35	5	309.8	326.3	342.7	41	6	334.9	351.3	367.8
17	3	127.1	143.6	160.0	23	4	203.1	219.5	236.0	29	5	265.4	281.9	298.3	35	6	310.7	327.1	343.6	42	0	335.2	351.6	368.1
17	4	129.0	145.5	161.9	23	5	204.7	221.2	237.6	29	6	266.7	283.2	299.6	36	0	311.5	327.9	344.4					
17	5	130.9	147.4	163.8	23	6	206.3	222.8	239.2	30	0	268.0	284.4	300.9	36	1	312.3	328.7	345.2					
17	6	132.8	149.3	165.7	24	0	207.9	224.4	240.8	30	1	269.2	285.6	302.1	36	2	313.1	329.5	346.0					
18	0	134.7	151.1	167.6	24	1	209.5	226.0	242.4	30	2	270.4	286.9	303.3	36	3	313.9	330.3	346.8					

Head Circumference, Merz

Merz E. *Ultrasound in Gynecology and Obstetrics*. Stuttgart and New York: Thieme Medical Publishers, Inc., 1991, p. 312.

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
12	0	63.0	76.0	90.0	17	5	138.6	153.3	168.3	23	3	205.7	221.7	238.1	29	1	263.3	280.3	297.4	34	6	309.9	327.0	346.0
12	1	65.0	78.0	92.0	17	6	140.3	155.1	170.1	23	4	207.3	223.3	239.9	29	2	264.6	281.6	298.9	35	0	311.0	328.0	347.0
12	2	67.0	80.0	94.0	18	0	142.0	157.0	172.0	23	5	208.9	224.9	241.6	29	3	265.9	282.9	300.3	35	1	312.0	329.1	348.1
12	3	69.0	82.0	96.0	18	1	143.9	158.7	173.9	23	6	210.4	226.4	243.3	29	4	267.1	284.1	301.7	35	2	313.0	330.3	349.3
12	4	71.0	84.0	98.0	18	2	145.7	160.4	175.7	24	0	212.0	228.0	245.0	29	5	268.4	285.4	303.1	35	3	314.0	331.4	350.4
12	5	73.0	86.0	100.0	18	3	147.6	162.1	177.6	24	1	213.6	229.6	246.6	29	6	269.7	286.7	304.6	35	4	315.0	332.6	351.6
12	6	75.0	88.0	102.0	18	4	149.4	163.9	179.4	24	2	215.1	231.1	248.1	30	0	271.0	288.0	306.0	35	5	316.0	333.7	352.7
13	0	77.0	90.0	104.0	18	5	151.3	165.6	181.3	24	3	216.7	232.7	249.7	30	1	272.1	289.1	307.3	35	6	317.0	334.9	353.9
13	1	78.9	92.0	106.0	18	6	153.1	167.3	183.1	24	4	218.3	234.3	251.3	30	2	273.3	290.3	308.6	36	0	318.0	336.0	355.0
13	2	80.7	94.0	108.0	19	0	155.0	169.0	185.0	24	5	219.9	235.9	252.9	30	3	274.4	291.4	309.9	36	1	318.9	336.9	356.0
13	3	82.6	96.0	110.0	19	1	156.7	170.9	186.7	24	6	221.4	237.4	254.4	30	4	275.6	292.6	311.1	36	2	319.7	337.7	357.0
13	4	84.4	98.0	112.0	19	2	158.4	172.7	188.4	25	0	223.0	239.0	256.0	30	5	276.7	293.7	312.4	36	3	320.6	338.6	358.0
13	5	86.3	100.0	114.0	19	3	160.1	174.6	190.1	25	1	224.4	240.4	257.4	30	6	277.9	294.9	313.7	36	4	321.4	339.4	359.0
13	6	88.1	102.0	116.0	19	4	161.9	176.4	191.9	25	2	225.9	241.9	258.9	31	0	279.0	296.0	315.0	36	5	322.3	340.3	360.0
14	0	90.0	104.0	118.0	19	5	163.6	178.3	193.6	25	3	227.3	243.3	260.3	31	1	280.3	297.3	316.1	36	6	323.1	341.1	361.0
14	1	92.0	105.9	120.0	19	6	165.3	180.1	195.3	25	4	228.7	244.7	261.7	31	2	281.6	298.6	317.3	37	0	324.0	342.0	362.0
14	2	94.0	107.7	122.0	20	0	167.0	182.0	197.0	25	5	230.1	246.1	263.1	31	3	282.9	299.9	318.4	37	1	325.0	343.0	362.9
14	3	96.0	109.6	124.0	20	1	168.7	183.7	198.9	25	6	231.6	247.6	264.6	31	4	284.1	301.1	319.6	37	2	326.0	344.0	363.7
14	4	98.0	111.4	126.0	20	2	170.4	185.4	200.7	26	0	233.0	249.0	266.0	31	5	285.4	302.4	320.7	37	3	327.0	345.0	364.6
14	5	100.0	113.3	128.0	20	3	172.1	187.1	202.6	26	1	234.4	250.4	267.6	31	6	286.7	303.7	321.9	37	4	328.0	346.0	365.4
14	6	102.0	115.1	130.0	20	4	173.9	188.9	204.4	26	2	235.9	251.9	269.1	32	0	288.0	305.0	323.0	37	5	329.0	347.0	366.3
15	0	104.0	117.0	132.0	20	5	175.6	190.6	206.3	26	3	237.3	253.3	270.7	32	1	289.1	306.1	324.3	37	6	330.0	348.0	367.1
15	1	105.9	119.0	134.0	20	6	177.3	192.3	208.1	26	4	238.7	254.7	272.3	32	2	290.3	307.3	325.6	38	0	331.0	349.0	368.0
15	2	107.7	121.0	136.0	21	0	179.0	194.0	210.0	26	5	240.1	256.1	273.9	32	3	291.4	308.4	326.9	38	1	331.9	349.9	369.0
15	3	109.6	123.0	138.0	21	1	180.6	195.6	211.7	26	6	241.6	257.6	275.4	32	4	292.6	309.6	328.1	38	2	332.7	350.7	370.0
15	4	111.4	125.0	140.0	21	2	182.1	1971	213.4	27	0	243.0	259.0	277.0	32	5	293.7	310.7	329.4	38	3	333.6	351.6	371.0
15	5	113.3	127.0	142.0	21	3	183.7	198.7	215.1	27	1	244.4	260.4	278.4	32	6	294.9	311.9	330.7	38	4	334.4	352.4	372.0
15	6	115.1	129.0	144.0	21	4	185.3	200.3	216.9	27	2	245.9	261.9	279.9	33	0	296.0	313.0	332.0	38	5	335.3	353.3	373.0
16	0	117.0	131.0	146.0	21	5	186.9	201.9	218.6	27	3	247.3	263.3	281.3	33	1	297.0	314.1	333.1	38	6	336.1	354.1	374.0
16	1	118.9	132.9	147.9	21	6	188.4	203.4	220.3	27	4	248.7	264.7	282.7	33	2	298.0	315.3	334.3	39	0	337.0	355.0	375.0
16	2	120.7	134.7	149.7	22	0	190.0	205.0	222.0	27	5	250.1	266.1	284.1	33	3	299.0	316.4	335.4	39	1	337.9	355.9	375.9
16	3	122.6	136.6	151.6	22	1	191.6	206.7	223.6	27	6	251.6	267.6	285.6	33	4	300.0	317.6	336.6	39	2	338.7	356.7	376.7
16	4	124.4	138.4	153.4	22	2	193.1	208.4	225.1	28	0	253.0	269.0	287.0	33	5	301.0	318.7	337.7	39	3	339.6	357.6	377.6
16	5	126.3	140.3	155.3	22	3	194.7	210.1	226.7	28	1	254.3	270.4	288.3	33	6	302.0	319.9	338.9	39	4	340.4	358.4	378.4
16	6	128.1	142.1	157.1	22	4	196.3	211.9	228.3	28	2	255.6	271.9	289.6	34	0	303.0	321.0	340.0	39	5	341.3	359.3	379.3
17	0	130.0	144.0	159.0	22	5	197.9	213.6	229.9	28	3	256.9	273.3	290.9	34	1	304.1	322.0	341.0	39	6	342.1	360.1	380.1
17	1	131.7	145.9	160.9	22	6	199.4	215.3	231.4	28	4	258.1	274.7	292.1	34	2	305.3	323.0	342.0	40	0	343.0	361.0	381.0
17	2	133.4	147.7	162.7	23	0	201.0	217.0	233.0	28	5	259.4	276.1	293.4	34	3	306.4	324.0	343.0					
17	3	135.1	149.6	164.6	23	1	202.6	218.6	234.7	28	6	260.7	277.6	294.7	34	4	307.6	325.0	344.0					
17	4	136.9	151.4	166.4	23	2	204.1	220.1	236.4	29	0	262.0	279.0	296.0	34	5	308.7	326.0	345.0					

Head Circumference, Hansmann

Hansmann M, Hackelöer B-J, Staudach A. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, 1985, p. 176.

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
10	0	26.0	50.0	74.0	16	1	102.9	127.7	151.9	22	2	177.1	201.4	226.1	28	3	241.9	265.9	290.3	34	4	291.4	316.0	340.0
10	1	27.7	51.9	75.9	16	2	104.7	129.4	153.7	22	3	178.7	203.1	227.7	28	4	243.1	267.1	291.7	34	5	292.3	317.0	341.0
10	2	29.4	53.7	77.7	16	3	106.6	131.1	155.6	22	4	180.3	204.9	229.3	28	5	244.4	268.4	293.1	34	6	293.1	318.0	342.0
10	3	31.1	55.6	79.6	16	4	108.4	132.9	157.4	22	5	181.9	206.6	230.9	28	6	245.7	269.7	294.6	35	0	294.0	319.0	343.0
10	4	32.9	57.4	81.4	16	5	110.3	134.6	159.3	22	6	183.4	208.3	232.4	29	0	247.0	271.0	296.0	35	1	294.9	319.9	343.9
10	5	34.6	59.3	83.3	16	6	112.1	136.3	161.1	23	0	185.0	210.0	234.0	29	1	248.3	272.4	297.3	35	2	295.7	320.7	344.7
10	6	36.3	61.1	85.1	17	0	114.0	138.0	163.0	23	1	186.6	211.6	235.6	29	2	249.6	273.9	298.6	35	3	296.6	321.6	345.6
11	0	38.0	63.0	87.0	17	1	115.7	139.9	164.7	23	2	188.1	213.1	237.1	29	3	250.9	275.3	299.9	35	4	297.4	322.4	346.4
11	1	39.9	64.7	88.9	17	2	117.4	141.7	166.4	23	3	189.7	214.7	238.7	29	4	252.1	276.7	301.1	35	5	298.3	323.3	347.3
11	2	41.7	66.4	90.7	17	3	119.1	143.6	168.1	23	4	191.3	216.3	240.3	29	5	253.4	278.1	302.4	35	6	299.1	324.1	348.1
11	3	43.6	68.1	92.6	17	4	120.9	145.4	169.9	23	5	192.9	217.9	241.9	29	6	254.7	279.6	303.7	36	0	300.0	325.0	349.0
11	4	45.4	69.9	94.4	17	5	122.6	147.3	171.6	23	6	194.4	219.4	243.4	30	0	256.0	281.0	305.0	36	1	300.9	325.7	349.9
11	5	47.3	71.6	96.3	17	6	124.3	149.1	173.3	24	0	196.0	221.0	245.0	30	1	257.3	282.1	306.1	36	2	301.7	326.4	350.7
11	6	49.1	73.3	98.1	18	0	126.0	151.0	175.0	24	1	197.6	222.6	246.6	30	2	258.6	283.3	307.3	36	3	302.6	327.1	351.6
12	0	51.0	75.0	100.0	18	1	127.7	152.7	176.7	24	2	199.1	224.1	248.1	30	3	259.9	284.4	308.4	36	4	303.4	327.9	352.4
12	1	52.9	76.9	101.7	18	2	129.4	154.4	178.4	24	3	200.7	225.7	249.7	30	4	261.1	285.6	309.6	36	5	304.3	328.6	353.3
12	2	54.7	78.7	103.4	18	3	131.1	156.1	180.1	24	4	202.3	227.3	251.3	30	5	262.4	286.7	310.7	36	6	305.1	329.3	354.1
12	3	56.6	80.6	105.1	18	4	132.9	157.9	181.9	24	5	203.9	228.9	252.9	30	6	263.7	287.9	311.9	37	0	306.0	330.0	355.0
12	4	58.4	82.4	106.9	18	5	134.6	159.6	183.6	24	6	205.4	230.4	254.4	31	0	265.0	289.0	313.0	37	1	306.7	330.7	355.6
12	5	60.3	84.3	108.6	18	6	136.3	161.3	185.3	25	0	207.0	232.0	256.0	31	1	266.1	290.1	314.3	37	2	307.4	331.4	356.1
12	6	62.1	86.1	110.3	19	0	138.0	163.0	187.0	25	1	208.6	233.4	257.4	31	2	267.3	291.3	315.6	37	3	308.1	332.1	356.7
13	0	64.0	88.0	112.0	19	1	139.7	164.7	188.7	25	2	210.1	234.9	258.9	31	3	268.4	292.4	316.9	37	4	308.9	332.9	357.3
13	1	65.7	89.9	113.9	19	2	141.4	166.4	190.4	25	3	211.7	236.3	260.3	31	4	269.6	293.6	318.1	37	5	309.6	333.6	357.9
13	2	67.4	91.7	115.7	19	3	143.1	168.1	192.1	25	4	213.3	237.7	261.7	31	5	270.7	294.7	319.4	37	6	310.3	334.3	358.4
13	3	69.1	93.6	117.6	19	4	144.9	169.9	193.9	25	5	214.9	239.1	263.1	31	6	271.9	295.9	320.7	38	0	311.0	335.0	359.0
13	4	70.9	95.4	119.4	19	5	146.6	171.6	195.6	25	6	216.4	240.6	264.6	32	0	273.0	297.0	322.0	38	1	311.6	335.6	359.7
13	5	72.6	97.3	121.3	19	6	148.3	173.3	197.3	26	0	218.0	242.0	266.0	32	1	274.1	298.1	323.0	38	2	312.1	336.1	360.4
13	6	74.3	99.1	123.1	20	0	150.0	175.0	199.0	26	1	219.4	243.4	267.6	32	2	275.3	299.3	324.0	38	3	312.7	336.7	361.1
14	0	76.0	101.0	125.0	20	1	151.7	176.7	200.7	26	2	220.9	244.9	269.1	32	3	276.4	300.4	325.0	38	4	313.3	337.3	361.9
14	1	77.9	102.7	126.9	20	2	153.4	178.4	202.4	26	3	222.3	246.3	270.7	32	4	277.6	301.6	326.0	38	5	313.9	337.9	362.6
14	2	79.7	104.4	128.7	20	3	155.1	180.1	204.1	26	4	223.7	247.7	272.3	32	5	278.7	302.7	327.0	38	6	314.4	338.4	363.3
14	3	81.6	106.1	130.6	20	4	156.9	181.9	205.9	26	5	225.1	249.1	273.9	32	6	279.9	303.9	328.0	39	0	315.0	339.0	364.0
14	4	83.4	107.9	132.4	20	5	158.6	183.6	207.6	26	6	226.6	250.6	275.4	33	0	281.0	305.0	329.0	39	1	315.6	339.6	364.4
14	5	85.3	109.6	134.3	20	6	160.3	185.3	209.3	27	0	228.0	252.0	277.0	33	1	282.0	306.0	330.0	39	2	316.1	340.1	364.9
14	6	87.1	111.3	136.1	21	0	162.0	187.0	211.0	27	1	229.4	253.4	278.3	33	2	283.0	307.0	331.0	39	3	316.7	340.7	365.3
15	0	89.0	113.0	138.0	21	1	163.7	188.6	212.7	27	2	230.9	254.9	279.6	33	3	284.0	308.0	332.0	39	4	317.3	341.3	365.7
15	1	90.7	114.9	139.7	21	2	165.4	190.1	214.4	27	3	232.3	256.3	280.9	33	4	285.0	309.0	333.0	39	5	31.79	341.9	366.1
15	2	92.4	116.7	141.4	21	3	167.1	191.7	216.1	27	4	233.7	257.7	282.1	33	5	286.0	310.0	334.0	39	6	318.4	342.4	366.6
15	3	94.1	118.6	143.1	21	4	168.9	193.3	217.9	27	5	235.1	259.1	283.4	33	6	287.0	311.0	335.0	40	0	319.0	343.0	367.0
15	4	95.9	120.4	144.9	21	5	170.6	194.9	219.6	27	6	236.6	260.6	284.7	34	0	288.0	312.0	336.0					
15	5	97.6	122.3	146.6	21	6	172.3	196.4	221.3	28	0	238.0	262.0	286.0	34	1	288.9	313.0	337.0					
15	6	99.3	124.1	148.3	22	0	174.0	198.0	223.0	28	1	239.3	263.3	287.4	34	2	289.7	314.0	338.0					
16	0	101.0	126.0	150.0	22	1	175.6	199.7	224.6	28	2	240.6	264.6	288.9	34	3	290.6	315.0	339.0					

Head Circumference (Plotted), Chitty

Chitty, LS, Altman, DG, "Charts of Fetal Size: 2. Head Measurements," *British Journal of Obstetrics & Gynaecology* 101:35-43, 1994.

HC Days	5%	mean mm	95%	HC Days	5%	mean mm	95%	HC Days	5%	mean mm	95%	HC Days	5%	mean mm	95%	HC Days	5%	mean mm	95%
84	58.9	69.5	80.0	131	147.5	160.7	173.8	178	224.1	239.8	255.5	225	284.4	302.6	320.8	272	323.9	344.7	365.5
85	60.9	71.5	82.1	132	149.3	162.5	175.6	179	225.6	241.3	257.0	226	285.5	303.7	322.0	273	324.5	345.3	366.2
86	62.9	73.5	84.2	133	151.1	164.3	177.5	180	227.1	242.8	258.6	227	286.5	304.8	323.2	274	325.1	346.0	366.9
87	64.8	75.6	86.3	134	152.8	166.1	179.4	181	228.5	244.3	260.2	228	287.6	305.9	324.3	275	325.7	346.6	367.5
88	66.8	77.6	88.4	135	154.6	167.9	181.2	182	230.0	245.8	261.7	229	288.6	307.0	325.5	276	326.2	347.2	368.2
89	68.8	79.6	90.4	136	156.3	169.7	183.1	183	231.4	247.3	263.3	230	289.6	308.1	326.6	277	326.8	347.8	368.8
90	70.7	81.6	92.5	137	158.1	171.5	185.0	184	232.8	248.8	264.8	231	290.7	309.2	327.8	278	327.3	348.4	369.5
91	72.7	83.6	94.6	138	159.8	173.3	186.8	185	234.3	250.3	266.3	232	291.7	310.3	328.9	279	327.8	348.9	370.1
92	74.7	85.7	96.6	139	161.6	175.1	188.6	186	235.7	251.8	267.9	233	292.7	311.3	330.0	280	328.3	349.5	370.7
93	76.6	87.7	98.7	140	163.3	176.9	190.5	187	237.1	253.2	269.4	234	293.7	312.4	331.1	281	328.8	350.1	371.3
94	78.6	89.7	100.8	141	165.0	178.6	192.3	188	238.5	254.7	270.9	235	294.7	313.4	332.2	282	329.3	350.6	371.9
95	80.5	91.7	102.8	142	166.7	180.4	194.1	189	239.9	256.1	272.4	236	295.7	314.5	333.3	283	329.8	351.1	372.5
96	82.4	93.7	104.9	143	168.4	182.2	195.9	190	241.2	257.6	273.9	237	296.6	315.5	334.3	284	330.2	351.6	373.0
97	84.4	95.6	106.9	144	170.1	183.9	197.8	191	242.6	259.0	275.4	238	297.6	316.5	335.4	285	330.7	352.1	373.6
98	86.3	97.6	109.0	145	171.8	185.7	199.6	192	244.0	260.4	276.8	239	298.5	317.5	336.5	286	331.1	352.6	374.1
99	88.2	99.6	111.0	146	173.5	187.4	201.4	193	245.3	261.8	278.3	240	299.5	318.5	337.5	287	331.5	353.1	374.7
100	90.2	101.6	113.0	147	175.2	189.2	203.1	194	246.7	263.2	279.8	241	300.4	319.5	338.6	288	331.9	353.6	375.2
101	92.1	103.6	115.0	148	176.9	190.9	204.9	195	248.0	264.6	281.2	242	301.3	320.4	339.6	289	332.3	354.0	375.7
102	94.0	105.5	117.1	149	178.5	192.6	206.7	196	249.4	266.0	282.7	243	302.2	321.4	340.6	290	332.7	354.5	376.2
103	95.9	107.5	119.1	150	180.2	194.3	208.5	197	250.7	267.4	284.1	244	303.1	322.4	341.6	291	333.1	354.9	376.7
104	97.8	109.5	121.1	151	181.9	196.1	210.3	198	252.0	268.8	285.5	245	304.0	323.3	342.6	292	333.4	355.3	377.2
105	99.7	111.4	123.1	152	183.5	197.8	212.0	199	253.3	270.1	286.9	246	304.9	324.2	343.6	293	333.8	355.7	377.6
106	101.6	113.4	125.1	153	185.2	199.5	213.8	200	254.6	271.5	288.3	247	305.7	325.1	344.6	294	334.1	356.1	378.1
107	103.5	115.3	127.1	154	186.8	201.2	215.5	201	255.9	272.8	289.8	248	306.6	326.1	345.5				
108	105.4	117.3	129.1	155	188.4	202.8	217.3	202	257.2	274.2	291.1	249	307.4	327.0	346.5				
109	107.3	119.2	131.1	156	190.1	204.5	219.0	203	258.5	275.5	292.5	250	308.3	327.8	347.4				
110	109.2	121.1	133.1	157	191.7	206.2	220.7	204	259.8	276.8	293.9	251	309.1	328.7	348.3				
111	111.1	123.1	135.1	158	193.3	207.9	222.4	205	261.0	278.2	295.3	252	309.9	329.6	349.3				
112	112.9	125.0	137.1	159	194.9	209.5	224.2	206	262.3	279.5	296.6	253	310.7	330.5	350.2				
113	114.8	126.9	139.1	160	196.5	211.2	225.9	207	263.5	280.8	298.0	254	311.5	331.3	351.1				
114	116.7	128.8	141.0	161	198.1	212.8	227.6	208	264.8	282.0	299.3	255	312.3	332.1	352.0				
115	118.5	130.7	143.0	162	199.7	214.5	229.3	209	266.0	283.3	300.7	256	313.1	333.0	352.9				
116	120.4	132.7	144.9	163	201.3	216.1	231.0	210	267.2	284.6	302.0	257	313.8	333.8	353.7				
117	122.2	134.6	146.9	164	202.8	217.7	232.6	211	268.4	285.9	303.3	258	314.6	334.6	354.6				
118	124.1	136.5	148.9	165	204.4	219.4	234.3	212	269.6	287.1	304.6	259	315.3	335.4	355.4				
119	125.9	138.3	150.8	166	206.0	221.0	236.0	213	270.8	288.4	305.9	260	316.0	336.2	356.3				
120	127.7	140.2	152.7	167	207.5	222.6	237.6	214	272.0	289.6	307.2	261	316.8	336.9	357.1				
121	129.6	142.1	154.7	168	209.1	224.2	239.3	215	273.1	290.8	308.5	262	317.5	337.7	357.9				
122	131.4	144.0	156.6	169	210.6	225.8	241.0	216	274.3	292.0	309.8	263	318.2	338.4	358.7				
123	133.2	145.9	158.5	170	212.1	227.4	242.6	217	275.5	293.2	311.0	264	318.9	339.2	359.5				
124	135.0	147.7	160.5	171	213.7	228.9	244.2	218	276.6	294.4	312.3	265	319.5	339.9	360.3				
125	136.8	149.6	162.4	172	215.2	230.5	245.9	219	277.8	295.6	313.5	266	320.2	340.6	361.1				
126	138.6	151.5	164.3	173	216.7	232.1	247.5	220	278.9	296.8	314.8	267	320.8	341.3	361.8				
127	140.4	153.3	166.2	174	218.2	233.6	249.1	221	280.0	298.0	316.0	268	321.5	342.0	362.6				
128	142.2	155.1	168.1	175	219.7	235.2	250.7	222	281.1	299.2	317.2	269	322.1	342.7	363.3				
129	144.0	157.0	170.0	176	221.2	236.7	252.3	223	282.2	300.3	318.4	270	322.7	343.4	364.1				
130	145.8	158.8	171.9	177	222.7	238.3	253.9	224	283.3	301.5	319.6	271	323.3	344.1	364.8				

Head Circumference, ASUM

Westerway SC. "Ultrasonic Fetal Measurements: New Australian Standards for the New Millennium." *Aust NZ J Obstet Gynaecol* 40:3:297-302, 2000.

HC Days	5%	mean mm	95%	HC Days	5%	mean mm	95%	HC Days	5%	mean mm	95%	HC Days	5%	mean mm	95%	HC Days	5%	mean mm	95%
77	46.7	59.0	71.3	120	129.5	142.4	155.4	163	196.4	212.9	229.3	206	250.6	271.1	291.7	249	293.4	314.0	334.6
78	48.2	60.6	72.9	121	130.3	143.9	157.4	164	197.8	214.3	230.7	207	251.3	271.9	292.4	250	294.4	315.0	335.6
79	49.8	62.1	74.5	122	131.2	145.3	159.4	165	199.3	215.7	232.2	208	252.0	272.6	293.1	251	295.4	316.0	336.6
80	51.4	63.7	76.1	123	132.0	146.7	161.4	166	200.7	217.1	233.6	209	252.7	273.3	293.8	252	296.4	317.0	337.6
81	52.9	65.3	77.6	124	132.9	148.1	163.4	167	202.1	218.6	235.0	210	253.4	274.0	294.6	253	297.0	317.6	338.1
82	54.5	66.9	79.2	125	133.7	149.6	165.4	168	203.6	220.0	236.5	211	254.9	275.4	296.0	254	297.6	318.1	338.7
83	56.1	68.4	80.8	126	134.6	151.0	167.5	169	205.1	221.6	238.0	212	256.3	276.9	297.4	255	298.2	318.7	339.3
84	57.7	70.0	82.3	127	135.8	152.3	168.7	170	206.7	223.1	239.6	213	257.7	278.3	298.8	256	298.7	319.3	339.8
85	59.7	72.0	84.3	128	137.1	153.6	170.0	171	208.3	224.7	241.2	214	259.2	279.7	300.3	257	299.3	319.9	340.4
86	61.7	74.0	86.3	129	138.4	154.9	171.3	172	209.8	226.3	242.7	215	260.6	281.1	301.7	258	299.9	320.4	341.0
87	63.7	76.0	88.3	130	139.7	156.1	172.6	173	211.4	227.9	244.3	216	262.0	282.6	303.1	259	300.4	321.0	341.6
88	65.7	78.0	90.3	131	141.0	157.4	173.9	174	213.0	229.4	245.9	217	263.4	284.0	304.6	260	301.4	322.0	342.6
89	67.7	80.0	92.3	132	142.3	158.7	175.2	175	214.6	231.0	247.5	218	264.0	284.6	305.1	261	302.4	323.0	343.6
90	69.7	82.0	94.3	133	143.6	160.0	176.5	176	215.6	232.0	248.5	219	264.6	285.1	305.7	262	303.4	324.0	344.6
91	71.7	84.0	96.3	134	145.0	161.4	177.9	177	216.6	233.0	249.5	220	265.2	285.7	306.3	263	304.4	325.0	345.6
92	73.4	85.7	98.1	135	146.4	162.9	179.3	178	217.6	234.0	250.5	221	265.7	286.3	306.8	264	305.4	326.0	346.6
93	75.1	87.4	99.8	136	147.8	164.3	180.7	179	218.6	235.0	251.5	222	266.3	286.9	307.4	265	306.4	327.0	347.6
94	76.8	89.1	101.5	137	149.3	165.7	182.2	180	219.6	236.0	252.5	223	266.9	287.4	308.0	266	307.4	328.0	348.6
95	78.5	90.9	103.2	138	150.7	167.1	183.6	181	220.6	237.0	253.5	224	267.4	288.0	308.6	267	308.6	329.1	349.7
96	80.2	92.6	104.9	139	152.1	168.6	185.0	182	221.6	238.0	254.5	225	269.2	289.7	310.3	268	309.7	330.3	350.8
97	81.9	94.3	106.6	140	153.6	170.0	186.5	183	223.3	239.7	256.2	226	270.9	291.4	312.0	269	310.9	331.4	352.0
98	83.7	96.0	108.3	141	154.4	170.9	187.3	184	225.0	241.4	257.9	227	272.6	293.1	313.7	270	312.0	332.6	353.1
99	85.4	97.7	110.1	142	155.3	171.7	188.2	185	226.7	243.1	259.6	228	274.3	294.9	315.4	271	313.2	333.7	354.3
100	87.1	99.4	111.8	143	156.1	172.6	189.0	186	228.4	244.9	261.3	229	276.0	296.6	317.1	272	314.3	334.9	355.4
101	88.8	101.1	113.5	144	157.0	173.4	189.9	187	230.1	246.6	263.0	230	277.7	298.3	318.8	273	315.4	336.0	356.6
102	90.5	102.9	115.2	145	157.8	174.3	190.7	188	231.8	248.3	264.7	231	279.4	300.0	320.6	274	316.0	336.6	357.1
103	92.2	104.6	116.9	146	158.7	175.1	191.6	189	233.6	250.0	266.5	232	280.2	300.7	321.3	275	316.6	337.1	357.7
104	93.9	106.3	118.6	147	159.6	176.0	192.5	190	235.4	251.9	268.3	233	280.9	301.4	322.0	276	317.2	337.7	358.3
105	95.7	108.0	120.3	148	161.3	177.7	194.2	191	237.3	253.7	270.2	234	281.6	302.1	322.7	277	317.7	338.3	358.8
106	98.5	110.9	123.2	149	163.0	179.4	195.9	192	239.1	255.6	272.0	235	282.3	302.9	323.4	278	318.3	338.9	359.4
107	101.4	113.7	126.1	150	164.7	181.1	197.6	193	241.0	257.4	273.9	236	283.0	303.6	324.1	279	318.9	339.4	360.0
108	104.2	116.6	128.9	151	166.4	182.9	199.3	194	242.8	259.3	275.7	237	283.7	304.3	324.8	280	319.4	340.0	360.6
109	107.1	119.4	131.8	152	168.1	184.6	201.0	195	244.7	261.1	277.6	238	284.4	305.0	325.6	281	320.0	340.6	361.1
110	109.9	122.3	134.6	153	169.8	186.3	202.7	196	246.6	263.0	279.5	239	285.2	305.7	326.3	282	320.6	341.1	361.7
111	112.8	125.1	137.5	154	171.6	188.0	204.5	197	246.8	263.9	280.9	240	285.9	306.4	327.0	283	321.2	341.7	362.3
112	115.7	128.0	140.3	155	174.7	191.1	207.6	198	247.1	264.7	282.3	241	286.6	307.1	327.7	284	321.7	342.3	362.8
113	117.5	129.9	142.2	156	177.8	194.3	210.7	199	247.4	265.6	283.8	242	287.3	307.9	328.4	285	322.3	342.9	363.4
114	119.4	131.7	144.1	157	181.0	197.4	213.9	200	247.6	266.4	285.2	243	288.0	308.6	329.1	286	322.9	343.4	364.0
115	121.2	133.6	145.9	158	184.1	200.6	217.0	201	247.9	267.3	286.7	244	288.7	309.3	329.8	287	323.4	344.0	364.6
116	123.1	135.4	147.8	159	187.3	203.7	220.2	202	248.2	268.1	288.1	245	289.4	310.0	330.6				
117	124.9	137.3	149.6	160	190.4	206.9	223.3	203	248.4	269.0	289.6	246	290.4	311.0	331.6				
118	126.8	139.1	151.5	161	193.6	210.0	226.5	204	249.2	269.7	290.3	247	291.4	312.0	332.6				
119	128.7	141.0	153.3	162	195.0	211.4	227.9	205	249.9	270.4	291.0	248	292.4	313.0	333.6				

Abdominal Circumference, Hadlock

Hadlock FP, Deter RL, Harrist RB, Park SK. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters." *Radiology* 152:497, 1984.

AC(cm) = -13.3 + 1.61 * MA(wks) - 0.00998 * MA(wks)^2 Standard Deviation = ± 13.4 mm 5 & 95%: ± 22 mm

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
12	0	23.8	45.8	67.8	18	1	104.2	126.2	148.2	24	2	177.1	199.1	221.1	30	3	242.5	264.5	286.5	36	4	300.3	322.3	344.3
12	1	25.8	47.8	69.8	18	2	106.0	128.0	150.0	24	3	178.7	200.7	222.7	30	4	243.9	265.9	287.9	36	5	301.6	323.6	345.6
12	2	27.7	49.7	71.7	18	3	107.8	129.8	151.8	24	4	180.3	202.3	224.3	30	5	245.4	267.4	289.4	36	6	302.8	324.8	346.8
12	3	29.7	51.7	73.7	18	4	109.6	131.6	153.6	24	5	181.9	203.9	225.9	30	6	246.8	268.8	290.8	37	0	304.1	326.1	348.1
12	4	31.6	53.6	75.6	18	5	111.3	133.3	155.3	24	6	183.5	205.5	227.5	31	0	248.2	270.2	292.2	37	1	305.3	327.3	349.3
12	5	33.6	55.6	77.6	18	6	113.1	135.1	157.1	25	0	185.1	207.1	229.1	31	1	249.6	271.6	293.6	37	2	306.6	328.6	350.6
12	6	35.5	57.5	79.5	19	0	114.9	136.9	158.9	25	1	186.7	208.7	230.7	31	2	251.0	273.0	295.0	37	3	307.8	329.8	351.8
13	0	37.4	59.4	81.4	19	1	116.6	138.6	160.6	25	2	188.3	210.3	232.3	31	3	252.4	274.4	296.4	37	4	309.0	331.0	353.0
13	1	39.4	61.4	83.4	19	2	118.4	140.4	162.4	25	3	189.9	211.9	233.9	31	4	253.8	275.8	297.8	37	5	310.2	332.2	354.2
13	2	41.3	63.3	85.3	19	3	120.1	142.1	164.1	25	4	191.4	213.4	235.4	31	5	255.2	277.2	299.2	37	6	311.5	333.5	355.5
13	3	43.2	65.2	87.2	19	4	121.9	143.9	165.9	25	5	193.0	215.0	237.0	31	6	256.6	278.6	300.6	38	0	312.7	334.7	356.7
13	4	45.1	67.1	89.1	19	5	123.6	145.6	167.6	25	6	194.6	216.6	238.6	32	0	258.0	280.0	302.0	38	1	313.9	335.9	357.9
13	5	47.0	69.0	91.0	19	6	125.3	147.3	169.3	26	0	196.1	218.1	240.1	32	1	259.4	281.4	303.4	38	2	315.1	337.1	359.1
13	6	48.9	70.9	92.9	20	0	127.1	149.1	171.1	26	1	197.7	219.7	241.7	32	2	260.8	282.8	304.8	38	3	316.3	338.3	360.3
14	0	50.8	72.8	94.8	20	1	128.8	150.8	172.8	26	2	199.2	221.2	243.2	32	3	262.1	284.1	306.1	38	4	317.5	339.5	361.5
14	1	52.7	74.7	96.7	20	2	130.5	152.5	174.5	26	3	200.8	222.8	244.8	32	4	263.5	285.5	307.5	38	5	318.7	340.7	362.7
14	2	54.6	76.6	98.6	20	3	132.3	154.3	176.3	26	4	202.3	224.3	246.3	32	5	264.9	286.9	308.9	38	6	319.9	341.9	363.9
14	3	56.5	78.5	100.5	20	4	134.0	156.0	178.0	26	5	203.9	225.9	247.9	32	6	266.3	288.3	310.3	39	0	321.1	343.1	365.1
14	4	58.4	80.4	102.4	20	5	135.7	157.7	179.7	26	6	205.4	227.4	249.4	33	0	267.6	289.6	311.6	39	1	322.3	344.3	366.3
14	5	60.3	82.3	104.3	20	6	137.4	159.4	181.4	27	0	206.9	228.9	250.9	33	1	269.0	291.0	313.0	39	2	323.5	345.5	3675
14	6	62.2	84.2	106.2	21	0	139.1	161.1	183.1	27	1	208.5	230.5	252.5	33	2	270.3	292.3	314.3	39	3	324.6	346.6	368.6
15	0	64.0	86.0	108.0	21	1	140.8	162.8	184.8	27	2	210.0	232.0	254.0	33	3	271.7	293.7	315.7	39	4	325.8	347.8	369.8
15	1	65.9	87.9	109.9	21	2	142.5	164.5	186.5	27	3	211.5	233.5	255.5	33	4	273.0	295.0	317.0	39	5	327.0	349.0	371.0
15	2	67.8	89.8	111.8	21	3	144.2	166.2	188.2	27	4	213.0	235.0	257.0	33	5	274.4	296.4	318.4	39	6	328.2	350.2	372.2
15	3	69.6	91.6	113.6	21	4	145.9	167.9	189.9	27	5	214.5	236.5	258.5	33	6	275.7	297.7	319.7	40	0	329.3	351.3	373.3
15	4	71.5	93.5	115.5	21	5	147.5	169.5	191.5	27	6	216.1	238.1	260.1	34	0	277.0	299.0	321.0	40	1	330.5	352.5	374.5
15	5	73.4	95.4	117.4	21	6	149.2	171.2	193.2	28	0	217.6	239.6	261.6	34	1	278.4	300.4	322.4	40	2	331.6	353.6	375.6
15	6	75.2	97.2	119.2	22	0	150.9	172.9	194.9	28	1	219.1	241.1	263.1	34	2	279.7	301.7	323.7	40	3	332.8	354.8	376.8
16	0	77.1	99.1	121.1	22	1	152.6	174.6	196.6	28	2	220.6	242.6	264.6	34	3	281.0	303.0	325.0	40	4	333.9	355.9	377.9
16	1	78.9	100.9	122.9	22	2	154.2	176.2	198.2	28	3	222.0	244.0	266.0	34	4	282.3	304.3	326.3	40	5	335.1	357.1	379.1
16	2	80.7	102.7	124.7	22	3	155.9	177.9	199.9	28	4	223.5	245.5	267.5	34	5	283.6	305.6	327.6	40	6	336.2	358.2	380.2
16	3	82.6	104.6	126.6	22	4	157.6	179.6	201.6	28	5	225.0	247.0	269.0	34	6	284.9	306.9	328.9	41	0	337.3	359.3	381.3
16	4	84.4	106.4	128.4	22	5	159.2	181.2	203.2	28	6	226.5	248.5	270.5	35	0	286.2	308.2	330.2	41	1	338.5	360.5	382.5
16	5	86.2	108.2	130.2	22	6	160.9	182.9	204.9	29	0	228.0	250.0	272.0	35	1	287.5	309.5	331.5	41	2	339.6	361.6	383.6
16	6	88.0	110.0	132.0	23	0	162.5	184.5	206.5	29	1	229.4	251.4	273.4	35	2	288.8	310.8	332.8	41	3	340.7	362.7	384.7
17	0	89.9	111.9	133.9	23	1	164.1	186.1	208.1	29	2	230.9	252.9	274.9	35	3	290.1	312.1	334.1	41	4	341.8	363.8	385.8
17	1	91.7	113.7	135.7	23	2	165.8	187.8	209.8	29	3	232.4	254.4	276.4	35	4	291.4	313.4	335.4	41	5	342.9	364.9	386.9
17	2	93.5	115.5	137.5	23	3	167.4	189.4	211.4	29	4	233.8	255.8	277.8	35	5	292.7	314.7	336.7	41	6	344.0	366.0	388.0
17	3	95.3	117.3	139.3	23	4	169.0	191.0	213.0	29	5	235.3	257.3	279.3	35	6	294.0	316.0	338.0	42	0	345.2	367.2	389.2
17	4	97.1	119.1	141.1	23	5	170.7	192.7	214.7	29	6	236.7	258.7	280.7	36	0	295.3	317.3	339.3					
17	5	98.9	120.9	142.9	23	6	172.3	194.3	216.3	30	0	238.2	260.2	282.2	36	1	296.5	318.5	340.5					
17	6	100.7	122.7	144.7	24	0	173.9	195.9	217.9	30	1	239.6	261.6	283.6	36	2	297.8	319.8	341.8					
18	0	102.5	124.5	146.5	24	1	175.5	197.5	219.5	30	2	241.1	263.1	285.1	36	3	299.1	321.1	343.1					

Abdominal Circumference, Merz

Merz E. *Ultrasound in Gynecology and Obstetrics*. Stuttgart and New York: Thieme Medical Publishers, Inc., 1991, p. 312.

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
12	0	40.0	58.0	76.0	17	5	96.1	117.1	137.9	23	3	152.3	175.7	199.3	29	1	208.4	234.4	260.6	34	6	264.6	293.4	321.4
12	1	41.4	59.4	77.6	17	6	97.6	118.6	139.4	23	4	153.7	177.3	200.7	29	2	209.9	235.9	262.1	35	0	266.0	295.0	323.0
12	2	42.9	60.9	79.1	18	0	99.0	120.0	141.0	23	5	155.1	178.9	202.1	29	3	211.3	237.3	263.7	35	1	267.4	296.4	324.6
12	3	44.3	62.3	80.7	18	1	100.3	121.4	142.6	23	6	156.6	180.4	203.6	29	4	212.7	238.7	265.3	35	2	268.9	297.9	326.1
12	4	45.7	63.7	82.3	18	2	101.6	122.9	144.1	24	0	158.0	182.0	205.0	29	5	214.1	240.1	266.9	35	3	270.3	299.3	327.7
12	5	47.1	65.1	83.9	18	3	102.9	124.3	145.7	24	1	159.3	183.4	206.6	29	6	215.6	241.6	268.4	35	4	271.7	300.7	329.3
12	6	48.6	66.6	85.4	18	4	104.1	125.7	147.3	24	2	160.6	184.9	208.1	30	0	217.0	243.0	270.0	35	5	273.1	302.1	330.9
13	0	50.0	68.0	87.0	18	5	105.4	127.1	148.9	24	3	161.9	186.3	209.7	30	1	218.4	244.4	271.4	35	6	274.6	303.6	332.4
13	1	51.4	69.6	88.6	18	6	106.7	128.6	150.4	24	4	163.1	187.7	211.3	30	2	219.9	245.9	272.9	36	0	276.0	305.0	334.0
13	2	52.9	71.1	90.1	19	0	108.0	130.0	152.0	24	5	164.4	189.1	212.9	30	3	221.3	247.3	274.3	36	1	277.4	306.4	335.4
13	3	54.3	72.7	91.7	19	1	109.4	131.4	153.4	24	6	165.7	190.6	214.4	30	4	222.7	248.7	275.7	36	2	278.9	307.9	336.9
13	4	55.7	74.3	93.3	19	2	110.9	132.9	154.9	25	0	167.0	192.0	216.0	30	5	224.1	250.1	277.1	36	3	280.3	309.3	338.3
13	5	57.1	75.9	94.9	19	3	112.3	134.3	156.3	25	1	168.4	193.4	217.6	30	6	225.6	251.6	278.6	36	4	281.7	310.7	339.7
13	6	58.6	77.4	96.4	19	4	113.7	135.7	157.7	25	2	169.9	194.9	219.1	31	0	227.0	253.0	280.0	36	5	283.1	312.1	341.1
14	0	60.0	79.0	98.0	19	5	115.1	137.1	159.1	25	3	171.3	196.3	220.7	31	1	228.4	254.6	281.6	36	6	284.6	313.6	342.6
14	1	61.3	80.4	99.6	19	6	116.6	138.6	160.6	25	4	172.7	197.7	222.3	31	2	229.9	256.1	283.1	37	0	286.0	315.0	344.0
14	2	62.6	81.9	101.1	20	0	118.0	140.0	162.0	25	5	174.1	199.1	223.9	31	3	231.3	257.7	284.7	37	1	287.4	316.4	345.6
14	3	63.9	83.3	102.7	20	1	119.4	141.6	163.6	25	6	175.6	200.6	225.4	31	4	232.7	259.3	286.3	37	2	288.9	317.9	347.1
14	4	65.1	84.7	104.3	20	2	120.9	143.1	165.1	26	0	177.0	202.0	227.0	31	5	234.1	260.9	287.9	37	3	290.3	319.3	348.7
14	5	66.4	86.1	105.9	20	3	122.3	144.7	166.7	26	1	178.4	203.4	228.6	31	6	235.6	262.4	289.4	37	4	291.7	320.7	350.3
14	6	67.7	87.6	107.4	20	4	123.7	146.3	168.3	26	2	179.9	204.9	230.1	32	0	237.0	264.0	291.0	37	5	293.1	322.1	351.9
15	0	69.0	89.0	109.0	20	5	125.1	147.9	169.9	26	3	181.3	206.3	231.7	32	1	238.3	265.4	292.6	37	6	294.6	323.6	353.4
15	1	70.4	90.4	110.4	20	6	126.6	149.4	171.4	26	4	182.7	207.7	233.3	32	2	239.6	266.9	294.1	38	0	296.0	325.0	355.0
15	2	71.9	91.9	111.9	21	0	128.0	151.0	173.0	26	5	184.1	209.1	234.9	32	3	240.9	268.3	295.7	38	1	297.4	326.6	356.4
15	3	73.3	93.3	113.3	21	1	129.4	152.4	174.6	26	6	185.6	210.6	236.4	32	4	242.1	269.7	297.3	38	2	298.9	328.1	357.9
15	4	74.7	94.7	114.7	21	2	130.9	153.9	176.1	27	0	187.0	212.0	238.0	32	5	243.4	271.1	298.9	38	3	300.3	329.7	359.3
15	5	76.1	96.1	116.1	21	3	132.3	155.3	177.7	27	1	188.4	213.6	239.4	32	6	244.7	272.6	300.4	38	4	301.7	331.3	360.7
15	6	77.6	97.6	117.6	21	4	133.7	156.7	179.3	27	2	189.9	215.1	240.9	33	0	246.0	274.0	302.0	38	5	303.1	332.9	362.1
16	0	79.0	99.0	119.0	21	5	135.1	158.1	180.9	27	3	191.3	216.7	242.3	33	1	247.4	275.4	303.4	38	6	304.6	334.4	363.6
16	1	80.4	100.6	120.6	21	6	136.6	159.6	182.4	27	4	192.7	218.3	243.7	33	2	248.9	276.9	304.9	39	0	306.0	336.0	365.0
16	2	81.9	102.1	122.1	22	0	138.0	161.0	184.0	27	5	194.1	219.9	245.1	33	3	250.3	278.3	306.3	39	1	307.4	337.4	366.6
16	3	83.3	103.7	123.7	22	1	139.4	162.4	185.6	27	6	195.6	221.4	246.6	33	4	251.7	279.7	307.7	39	2	308.9	338.9	368.2
16	4	84.7	105.3	125.3	22	2	140.9	163.9	187.1	28	0	197.0	223.0	248.0	33	5	253.1	281.1	309.1	39	3	310.3	340.3	369.7
16	5	86.1	106.9	126.9	22	3	142.3	165.3	188.7	28	1	198.4	224.4	249.6	33	6	254.6	282.6	310.6	39	4	311.7	341.7	371.3
16	6	87.6	108.4	128.4	22	4	143.7	166.7	190.3	28	2	199.9	225.9	251.1	34	0	256.0	284.0	312.0	39	5	313.1	343.1	372.9
17	0	89.0	110.0	130.0	22	5	145.1	168.1	191.9	28	3	201.3	227.3	252.7	34	1	257.4	285.6	313.6	39	6	314.6	344.6	374.4
17	1	90.4	111.4	131.6	22	6	146.6	169.6	193.4	28	4	202.7	228.7	254.3	34	2	258.9	287.1	315.1	40	0	316.0	346.0	376.0
17	2	91.9	112.9	133.1	23	0	148.0	171.0	195.0	28	5	204.1	230.1	255.9	34	3	260.3	288.7	316.7					
17	3	93.3	114.3	134.7	23	1	149.4	172.6	196.4	28	6	205.6	231.6	257.4	34	4	261.7	290.3	318.3					
17	4	94.7	115.7	136.3	23	2	150.9	174.1	197.9	29	0	207.0	233.0	259.0	34	5	263.1	291.9	319.9					

Abdominal Circumference, Jeanty

Jeanty P, Cousaert E, Cantraine F. "Normal growth of the abdominal perimeter." *American Journal of Perinatalogy* 1:136, 1984, p. 133.

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
12	0	35.0	57.0	80.0	17	5	93.9	116.1	138.9	23	3	155.7	177.7	200.3	29	1	214.3	236.3	258.4	34	6	262.9	285.0	307.9
12	1	36.4	58.4	81.4	17	6	95.4	117.6	140.4	23	4	157.3	179.3	201.7	29	2	215.6	237.6	259.9	35	0	264.0	286.0	309.0
12	2	37.9	59.9	82.9	18	0	97.0	119.0	142.0	23	5	158.9	180.9	203.1	29	3	216.9	238.9	261.3	35	1	265.0	287.0	310.0
12	3	39.3	61.3	84.3	18	1	98.6	120.6	143.4	23	6	160.4	182.4	204.6	29	4	218.1	240.1	262.7	35	2	266.0	288.0	311.0
12	4	40.7	62.7	85.7	18	2	100.1	122.1	144.9	24	0	162.0	184.0	206.0	29	5	219.4	241.4	264.1	35	3	267.0	289.0	312.0
12	5	42.1	64.1	87.1	18	3	101.7	123.7	146.3	24	1	163.4	185.6	207.6	29	6	220.7	242.7	265.6	35	4	268.0	290.0	313.0
12	6	43.6	65.6	88.6	18	4	103.3	125.3	147.7	24	2	164.9	187.1	209.1	30	0	222.0	244.0	267.0	35	5	269.0	291.0	314.0
13	0	45.0	67.0	90.0	18	5	104.9	126.9	149.1	24	3	166.3	188.7	210.7	30	1	223.3	245.4	268.3	35	6	270.0	292.0	315.0
13	1	46.4	68.4	91.4	18	6	106.4	128.4	150.6	24	4	167.7	190.3	212.3	30	2	224.6	246.9	269.6	36	0	271.0	293.0	316.0
13	2	47.9	69.9	92.9	19	0	108.0	130.0	152.0	24	5	169.1	191.9	213.9	30	3	225.9	248.3	270.9	36	1	272.0	294.0	316.9
13	3	49.3	71.3	94.3	19	1	109.6	131.6	153.6	24	6	170.6	193.4	215.4	30	4	227.1	249.7	272.1	36	2	273.0	295.0	317.7
13	4	50.7	72.7	95.7	19	2	111.1	133.1	155.1	25	0	172.0	195.0	217.0	30	5	228.4	251.1	273.4	36	3	274.0	296.0	318.6
13	5	52.1	74.1	97.1	19	3	112.7	134.7	156.7	25	1	173.6	196.4	218.4	30	6	229.7	252.6	274.7	36	4	275.0	297.0	319.4
13	6	53.6	75.6	98.6	19	4	114.3	136.3	158.3	25	2	175.1	197.9	219.9	31	0	231.0	254.0	276.0	36	5	276.0	298.0	320.3
14	0	55.0	77.0	100.0	19	5	115.9	137.9	159.9	25	3	176.7	199.3	221.3	31	1	232.3	255.1	277.3	36	6	277.0	299.0	321.1
14	1	56.4	78.6	101.4	19	6	117.4	139.4	161.4	25	4	178.3	200.7	222.7	31	2	233.6	256.3	278.6	37	0	278.0	300.0	322.0
14	2	57.9	80.1	102.9	20	0	119.0	141.0	163.0	25	5	179.9	202.1	224.1	31	3	234.9	257.4	279.9	37	1	278.7	300.9	322.9
14	3	59.3	81.7	104.3	20	1	120.4	142.6	164.6	25	6	181.4	203.6	225.6	31	4	236.1	258.6	281.1	37	2	279.4	301.7	323.7
14	4	60.7	83.3	105.7	20	2	121.9	144.1	166.1	26	0	183.0	205.0	227.0	31	5	237.4	259.7	282.4	37	3	280.1	302.6	324.6
14	5	62.1	84.9	107.1	20	3	123.3	145.7	167.7	26	1	184.4	206.4	228.6	31	6	238.7	260.9	283.7	37	4	280.9	303.4	325.4
14	6	63.6	86.4	108.6	20	4	124.7	147.3	169.3	26	2	185.9	207.9	230.1	32	0	240.0	262.0	285.0	37	5	281.6	304.3	326.3
15	0	65.0	88.0	110.0	20	5	126.1	148.9	170.9	26	3	187.3	209.3	231.7	32	1	241.1	263.3	286.1	37	6	282.3	305.1	327.1
15	1	66.6	89.4	111.4	20	6	127.6	150.4	172.4	26	4	188.7	210.7	233.3	32	2	242.3	264.6	287.3	38	0	283.0	306.0	328.0
15	2	68.1	90.9	112.9	21	0	129.0	152.0	174.0	26	5	190.1	212.1	234.9	32	3	243.4	265.9	288.4	38	1	283.9	306.7	328.7
15	3	69.7	92.3	114.3	21	1	130.6	153.6	175.6	26	6	191.6	213.6	236.4	32	4	244.6	267.1	289.6	38	2	284.7	307.4	329.4
15	4	71.3	93.7	115.7	21	2	132.1	155.1	177.1	27	0	193.0	215.0	238.0	32	5	245.7	268.4	290.7	38	3	285.6	308.1	330.1
15	5	72.9	95.1	117.1	21	3	133.7	156.7	178.7	27	1	194.4	216.4	239.4	32	6	246.9	269.7	291.9	38	4	286.4	308.9	330.9
15	6	74.4	96.6	118.6	21	4	135.3	158.3	180.3	27	2	195.9	217.9	240.9	33	0	248.0	271.0	293.0	38	5	287.3	309.6	331.6
16	0	76.0	98.0	120.0	21	5	136.9	159.9	181.9	27	3	197.3	219.3	242.3	33	1	249.1	272.1	294.1	38	6	288.1	310.3	332.3
16	1	77.4	99.6	121.6	21	6	138.4	161.4	183.4	27	4	198.7	220.7	243.7	33	2	250.3	273.3	295.3	39	0	289.0	311.0	333.0
16	2	78.9	101.1	123.1	22	0	140.0	163.0	185.0	27	5	200.1	222.1	245.1	33	3	251.4	274.4	296.4	39	1	289.7	311.7	333.7
16	3	80.3	102.7	124.7	22	1	141.6	164.4	186.6	27	6	201.6	223.6	246.6	33	4	252.6	275.6	297.6	39	2	290.4	312.4	334.4
16	4	81.7	104.3	126.3	22	2	143.1	165.9	188.1	28	0	203.0	225.0	248.0	33	5	253.7	276.7	298.7	39	3	291.1	313.1	335.1
16	5	83.1	105.9	127.9	22	3	144.7	167.3	189.7	28	1	204.4	226.4	249.4	33	6	254.9	277.9	299.9	39	4	291.9	313.9	335.9
16	6	84.6	107.4	129.4	22	4	146.3	168.7	191.3	28	2	205.9	227.9	250.6	34	0	256.0	279.0	301.0	39	5	292.6	314.6	336.6
17	0	86.0	109.0	131.0	22	5	147.9	170.1	192.9	28	3	207.3	229.3	251.9	34	1	257.1	280.0	302.1	39	6	293.3	315.3	337.3
17	1	87.6	110.4	132.6	22	6	149.4	171.6	194.4	28	4	208.7	230.7	253.1	34	2	258.3	281.0	303.3	40	0	294.0	316.0	338.0
17	2	89.1	111.9	134.1	23	0	151.0	173.0	196.0	28	5	210.1	232.1	254.4	34	3	259.4	282.0	304.4					
17	3	90.7	113.3	135.7	23	1	152.6	174.6	197.4	28	6	211.6	233.6	255.7	34	4	260.6	283.0	305.6					
17	4	92.3	114.7	137.3	23	2	154.1	176.1	198.9	29	0	213.0	235.0	257.0	34	5	261.7	284.0	306.7					

Abdominal Circumference, JSUM

Japan Society of Ultrasonics in Medicine. "Standardization of Fetometry and Official Announcement of Diagnostic Guidelines." *J. Med. Ultrasonics* 28:844-872, 2001.

AC Days	- 1.5SD	mean mm	+ 1.5SD	AC Days	- 1.5SD	mean mm	+ 1.5SD	AC Days	- 1.5SD	mean mm	+ 1.5SD	AC Days	- 1.5SD	mean mm	+ 1.5SD	AC Days	- 1.5SD	mean mm	+ 1.5SD
112	89.8	104.0	118.3	149	140.4	157.9	176.1	186	188.4	210.1	232.0	223	232.5	257.9	283.9	260	270.6	300.0	329.4
113	91.1	105.4	119.8	150	141.7	159.3	177.6	187	189.7	211.4	233.5	224	233.5	259.0	285.3	261	271.5	301.0	330.5
114	92.4	106.9	121.3	151	143.0	160.7	179.1	188	191.0	212.7	235.0	225	234.7	260.3	286.5	262	272.4	302.0	331.6
115	93.7	108.3	122.9	152	144.4	162.1	180.7	189	192.3	214.0	236.5	226	235.9	261.6	287.8	263	273.3	303.0	332.7
116	95.0	109.7	124.4	153	145.7	163.6	182.2	190	193.5	215.4	237.9	227	237.0	262.9	289.1	264	274.2	304.0	333.8
117	96.4	111.1	125.9	154	147.0	165.0	183.8	191	194.7	216.9	239.4	228	238.2	264.1	290.4	265	275.1	305.0	334.9
118	97.7	112.6	127.5	155	148.3	166.4	185.3	192	195.9	218.3	240.8	229	239.4	265.4	291.7	266	276.0	306.0	336.0
119	99.0	114.0	129.0	156	149.6	167.9	186.8	193	197.1	219.7	242.2	230	240.6	266.7	293.0	267	276.9	307.0	337.1
120	100.5	115.6	130.7	157	151.0	169.3	188.4	194	198.3	221.1	243.6	231	241.8	268.0	294.3	268	277.8	308.0	338.2
121	101.9	117.1	132.4	158	152.3	170.7	189.9	195	199.5	222.6	245.1	232	242.8	269.1	295.5	269	278.7	309.0	339.3
122	103.4	118.7	134.0	159	153.6	172.1	191.4	196	200.8	224.0	246.5	233	243.8	270.3	296.8	270	279.6	310.0	340.4
123	104.9	120.3	135.7	160	154.9	173.6	193.0	197	202.0	225.3	247.9	234	244.9	271.4	298.0	271	280.5	311.0	341.5
124	106.3	121.9	137.4	161	156.3	175.0	194.5	198	203.3	226.6	249.3	235	245.9	272.6	299.3	272	281.4	312.0	342.6
125	107.8	123.4	139.1	162	157.6	176.4	196.0	199	204.6	227.9	250.7	236	246.9	273.7	300.5	273	282.3	313.0	343.8
126	109.3	125.0	140.8	163	158.9	177.9	197.6	200	205.9	229.1	252.1	237	248.0	274.9	301.8	274	283.0	313.9	344.7
127	110.6	126.4	142.3	164	160.2	179.3	199.1	201	207.2	230.4	253.5	238	249.0	276.0	303.0	275	283.8	314.7	345.7
128	111.9	127.9	143.8	165	161.5	180.7	200.6	202	208.5	231.7	254.9	239	250.0	277.1	304.3	276	284.5	315.6	346.6
129	113.2	129.3	145.4	166	162.9	182.1	202.2	203	209.8	233.0	256.3	240	251.1	278.3	305.5	277	285.3	316.4	347.6
130	114.5	130.7	146.9	167	164.2	183.6	203.7	204	210.9	234.3	257.6	241	252.1	279.4	306.8	278	286.0	317.3	348.6
131	115.9	132.1	148.4	168	165.5	185.0	205.3	205	212.1	235.6	259.0	242	253.1	280.6	308.0	279	286.8	318.1	349.5
132	117.2	133.6	150.0	169	166.8	186.4	206.8	206	213.3	236.9	260.4	243	254.2	281.7	309.3	280	287.5	319.0	350.5
133	118.5	135.0	151.5	170	168.1	187.9	208.3	207	214.5	238.1	261.8	244	255.2	282.9	310.5	281	288.3	319.9	351.5
134	119.8	136.4	153.0	171	169.5	189.3	209.9	208	215.6	239.4	263.2	245	256.3	284.0	311.8	282	289.0	320.7	352.4
135	121.1	137.9	154.6	172	170.8	190.7	211.4	209	216.8	240.7	264.6	246	257.3	285.1	313.0	283	289.8	321.6	353.4
136	122.5	139.3	156.1	173	172.1	192.1	212.9	210	218.0	242.0	266.0	247	258.3	286.3	314.3	284	290.5	322.4	354.4
137	123.8	140.7	157.6	174	173.4	193.6	214.5	211	219.2	243.3	267.4	248	259.4	287.4	315.5	285	291.3	323.3	355.3
138	125.1	142.1	159.2	175	174.8	195.0	216.0	212	220.4	244.6	268.8	249	260.4	288.6	316.8	286	292.0	324.1	356.3
139	126.4	143.6	160.7	176	176.0	196.4	217.4	213	221.5	245.9	270.2	250	261.4	289.7	318.0	287	292.8	325.0	357.3
140	127.8	145.0	162.3	177	177.2	197.9	218.9	214	222.7	247.1	271.6	251	262.5	290.9	319.3	288	293.5	325.9	358.2
141	129.2	146.4	163.8	178	178.4	199.3	220.3	215	223.9	248.4	273.0	252	263.5	292.0	320.5	289	294.3	326.7	359.2
142	130.6	147.9	165.3	179	179.6	200.7	221.7	216	225.1	249.7	274.4	253	264.4	293.0	321.6	290	295.0	327.6	360.1
143	132.0	149.3	166.9	180	180.8	202.1	223.1	217	226.3	251.0	275.8	254	265.3	294.0	322.7	291	295.8	328.4	361.1
144	133.5	150.7	168.4	181	182.0	203.6	224.6	218	227.3	252.1	277.1	255	266.2	295.0	323.8	292	296.5	329.3	362.1
145	134.9	152.1	169.9	182	183.3	205.0	226.0	219	228.3	253.3	278.5	256	267.1	296.0	324.9	293	297.3	330.1	363.0
146	136.3	153.6	171.5	183	184.5	206.3	227.5	220	229.4	254.4	279.8	257	268.0	297.0	326.0	294	298.0	331.0	364.0
147	137.8	155.0	173.0	184	185.8	207.6	229.0	221	230.4	255.6	281.2	258	268.9	298.0	327.1				
148	139.1	156.4	174.5	185	187.1	208.9	230.5	222	231.4	256.7	282.5	259	269.8	299.0	328.3				

Abdominal Circumference, ASUM

Westerway SC. "Ultrasonic Fetal Measurements: New Australian Standards for the New Millennium." *Aust NZ J Obstet Gynaecol* 40:3:297-302, 2000.

AC Days	5%	mean mm	95%	AC Days	5%	mean mm	95%	AC Days	5%	mean mm	95%	AC Days	5%	mean mm	95%	AC Days	5%	mean mm	95%
77	43.8	52.0	60.2	120	109.2	121.6	133.9	163	173.8	190.3	206.7	206	239.7	260.3	280.8	249	293.7	320.7	347.7
78	45.3	53.6	61.8	121	110.8	123.1	135.5	164	176.0	192.4	208.9	207	240.2	260.7	281.3	250	294.5	322.1	349.8
79	46.9	55.1	63.4	122	112.4	124.7	137.1	165	178.1	194.6	211.0	208	240.6	261.1	281.7	251	295.4	323.6	351.8
80	48.5	56.7	64.9	123	113.9	126.3	138.6	166	180.3	196.7	213.2	209	241.0	261.6	282.1	252	296.2	325.0	353.8
81	50.1	58.3	66.5	124	115.5	127.9	140.2	167	182.4	198.9	215.3	210	241.4	262.0	282.6	253	297.4	326.1	354.9
82	51.6	59.9	68.1	125	117.1	129.4	141.8	168	184.6	201.0	217.5	211	242.3	263.4	284.6	254	298.5	327.3	356.1
83	53.2	61.4	69.7	126	118.7	131.0	143.3	169	186.1	202.6	219.0	212	243.1	264.9	286.6	255	299.6	328.4	357.2
84	54.8	63.0	71.2	127	119.9	132.3	144.6	170	187.7	204.1	220.6	213	244.0	266.3	288.6	256	300.8	329.6	358.4
85	56.3	64.6	72.8	128	121.2	133.6	145.9	171	189.3	205.7	222.2	214	244.8	267.7	290.6	257	301.9	330.7	359.5
86	57.9	66.1	74.4	129	122.5	134.9	147.2	172	190.8	207.3	223.7	215	245.6	269.1	292.6	258	303.1	331.9	360.6
87	59.5	67.7	75.9	130	123.8	136.1	148.5	173	192.4	208.9	225.3	216	246.5	270.6	294.7	259	304.2	333.0	361.8
88	61.1	69.3	77.5	131	125.1	137.4	149.8	174	194.0	210.4	226.9	217	247.3	272.0	296.7	260	305.5	334.3	363.1
89	62.6	70.9	79.1	132	126.4	138.7	151.1	175	195.6	212.0	228.5	218	248.9	273.6	298.2	261	306.8	335.6	364.4
90	64.2	72.4	80.7	133	127.7	140.0	152.3	176	196.5	213.6	230.6	219	250.5	275.1	299.8	262	308.1	336.9	365.6
91	65.8	74.0	82.2	134	129.2	141.6	153.9	177	197.5	215.1	232.8	220	252.0	276.7	301.4	263	309.4	338.1	366.9
92	67.2	75.4	83.7	135	130.8	143.1	155.5	178	198.5	216.7	234.9	221	253.6	278.3	303.0	264	310.6	339.4	368.2
93	68.6	76.9	85.1	136	132.4	144.7	157.1	179	199.5	218.3	237.1	222	255.2	279.9	304.5	265	311.9	340.7	369.5
94	70.1	78.3	86.5	137	133.9	146.3	158.6	180	200.5	219.9	239.2	223	256.8	281.4	306.1	266	313.2	342.0	370.8
95	71.5	79.7	87.9	138	135.5	147.9	160.2	181	201.5	221.4	241.4	224	258.3	283.0	307.7	267	315.2	344.0	372.8
96	72.9	81.1	89.4	139	137.1	149.4	161.8	182	202.4	223.0	243.6	225	259.9	284.6	309.2	268	317.2	346.0	374.8
97	74.3	82.6	90.8	140	138.7	151.0	163.3	183	203.4	224.0	244.6	226	261.5	286.1	310.8	269	319.2	348.0	376.8
98	75.8	84.0	92.2	141	139.9	152.9	165.8	184	204.4	225.0	245.6	227	263.0	287.7	312.4	270	321.2	350.0	378.8
99	77.5	85.7	93.9	142	141.2	154.7	168.2	185	205.4	226.0	246.6	228	264.6	289.3	314.0	271	323.2	352.0	380.8
100	79.2	87.4	95.7	143	142.5	156.6	170.7	186	206.4	227.0	247.6	229	266.2	290.9	315.5	272	325.2	354.0	382.8
101	80.9	89.1	97.4	144	143.7	158.4	173.1	187	207.4	228.0	248.6	230	267.8	292.4	317.1	273	327.2	356.0	384.8
102	82.6	90.9	99.1	145	145.0	160.3	175.6	188	208.4	229.0	249.6	231	269.3	294.0	318.7	274	328.1	356.9	385.6
103	84.3	92.6	100.8	146	146.3	162.1	178.0	189	209.4	230.0	250.6	232	270.9	295.6	320.2	275	328.9	357.7	386.5
104	86.1	94.3	102.5	147	147.6	164.0	180.5	190	211.2	231.7	252.3	233	272.5	297.1	321.8	276	329.8	358.6	387.4
105	87.8	96.0	104.2	148	149.3	165.7	182.2	191	212.9	233.4	254.0	234	274.0	298.7	323.4	277	330.6	359.4	388.2
106	89.2	97.4	105.7	149	151.0	167.4	183.9	192	214.6	235.1	255.7	235	275.6	300.3	325.0	278	331.5	360.3	389.1
107	90.6	98.9	107.1	150	152.7	169.1	185.6	193	216.3	236.9	257.4	236	277.2	301.9	326.5	279	332.4	361.1	389.9
108	92.1	100.3	108.5	151	154.4	170.9	187.3	194	218.0	238.6	259.1	237	278.8	303.4	328.1	280	333.2	362.0	390.8
109	93.5	101.7	109.9	152	156.1	172.6	189.0	195	219.7	240.3	260.8	238	280.3	305.0	329.7	281	333.9	362.7	391.5
110	94.9	103.1	111.4	153	157.8	174.3	190.7	196	221.4	242.0	262.6	239	281.8	306.4	331.1	282	334.6	363.4	392.2
111	96.3	104.6	112.8	154	159.6	176.0	192.5	197	223.9	244.4	265.0	240	283.2	307.9	332.5	283	335.4	364.1	392.9
112	97.8	106.0	114.2	155	161.0	177.4	193.9	198	226.3	246.9	267.4	241	284.6	309.3	334.0	284	336.1	364.9	393.6
113	99.2	108.0	116.8	156	162.4	178.9	195.3	199	228.7	249.3	269.8	242	286.0	310.7	335.4	285	336.8	365.6	394.4
114	100.6	110.0	119.4	157	163.8	180.3	196.7	200	231.2	251.7	272.3	243	287.5	312.1	336.8	286	337.5	366.3	395.1
115	102.0	112.0	122.0	158	165.3	181.7	198.2	201	233.6	254.1	274.7	244	288.9	313.6	338.2	287	338.2	367.0	395.8
116	103.4	114.0	124.6	159	166.7	183.1	199.6	202	236.0	256.6	277.1	245	290.3	315.0	339.7				
117	104.8	116.0	127.2	160	168.1	184.6	201.0	203	238.4	259.0	279.6	246	291.2	316.4	341.7				
118	106.3	118.0	129.8	161	169.6	186.0	202.5	204	238.9	259.4	280.0	247	292.0	317.9	343.7				
119	107.7	120.0	132.3	162	171.7	188.1	204.6	205	239.3	259.9	280.4	248	292.8	319.3	345.7				

Abdominal Circumference (Plotted), Chitty

Chitty, LS, Altman, DG, "Charts of Fetal Size: 2. Head Measurements," *British Journal of Obstetrics & Gynaecology* 101:35-43, 1994.

AC Days	5%	mean mm	95%
84	49.1	58.9	68.8
85	50.7	60.6	70.6
86	52.3	62.3	72.4
87	53.9	64.0	74.2
88	55.4	65.7	76.0
89	57.0	67.4	77.8
90	58.6	69.1	79.6
91	60.2	70.8	81.4
92	61.8	72.5	83.2
93	63.4	74.2	85.0
94	65.0	75.9	86.8
95	66.6	77.6	88.6
96	68.1	79.3	90.4
97	69.7	81.0	92.2
98	71.3	82.7	94.0
99	72.9	84.3	95.8
100	74.5	86.0	97.6
101	76.0	87.7	99.4
102	77.6	89.4	101.2
103	79.2	91.1	103.0
104	80.7	92.7	104.7
105	82.3	94.4	106.5
106	83.9	96.1	108.3
107	85.5	97.8	110.1
108	87.0	99.4	111.9
109	88.6	101.1	113.6
110	90.1	102.8	115.4
111	91.7	104.5	117.2
112	93.3	106.1	119.0
113	94.8	107.8	120.7
114	96.4	109.4	122.5
115	97.9	111.1	124.3
116	99.5	112.8	126.1
117	101.0	114.4	127.8
118	102.6	116.1	129.6
119	104.1	117.7	131.3
120	105.7	119.4	133.1
121	107.2	121.0	134.9
122	108.8	122.7	136.6
123	110.3	124.3	138.4
124	111.8	126.0	140.1
125	113.4	127.6	141.9
126	114.9	129.3	143.6

AC Days	5%	mean mm	95%
127	116.4	130.9	145.4
128	118.0	132.6	147.1
129	119.5	134.2	148.9
130	121.0	135.8	150.6
131	122.6	137.5	152.4
132	124.1	139.1	154.1
133	125.6	140.7	155.8
134	127.1	142.4	157.6
135	128.6	144.0	159.3
136	130.2	145.6	161.0
137	131.7	147.2	162.8
138	133.2	148.8	164.5
139	134.7	150.5	166.2
140	136.2	152.1	167.9
141	137.7	153.7	169.7
142	139.2	155.3	171.4
143	140.7	156.9	173.1
144	142.2	158.5	174.8
145	143.7	160.1	176.5
146	145.2	161.7	178.2
147	146.7	163.3	180.0
148	148.2	164.9	181.7
149	149.7	166.5	183.4
150	151.2	168.1	185.1
151	152.7	169.7	186.8
152	154.2	171.3	188.5
153	155.6	172.9	190.2
154	157.1	174.5	191.9
155	158.6	176.1	193.6
156	160.1	177.7	195.3
157	161.6	179.2	196.9
158	163.0	180.8	198.6
159	164.5	182.4	200.3
160	166.0	184.0	202.0
161	167.4	185.5	203.7
162	168.9	187.1	205.4
163	170.3	188.7	207.0
164	171.8	190.3	208.7
165	173.3	191.8	210.4
166	174.7	193.4	212.0
167	176.2	194.9	213.7
168	177.6	196.5	215.4
169	179.1	198.0	217.0

AC Days	5%	mean mm	95%
170	180.5	199.6	218.7
171	181.9	201.1	220.3
172	183.4	202.7	222.0
173	184.8	204.2	223.6
174	186.3	205.8	225.3
175	187.7	207.3	226.9
176	189.1	208.8	228.6
177	190.5	210.4	230.2
178	192.0	211.9	231.9
179	193.4	213.4	233.5
180	194.8	215.0	235.1
181	196.2	216.5	236.8
182	197.6	218.0	238.4
183	199.0	219.5	240.0
184	200.5	221.0	241.6
185	201.9	222.6	243.3
186	203.3	224.1	244.9
187	204.7	225.6	246.5
188	206.1	227.1	248.1
189	207.5	228.6	249.7
190	208.8	230.1	251.3
191	210.2	231.6	252.9
192	211.6	233.1	254.5
193	213.0	234.6	256.1
194	214.4	236.1	257.7
195	215.8	237.6	259.3
196	217.1	239.0	260.9
197	218.5	240.5	262.5
198	219.9	242.0	264.1
199	221.3	243.5	265.7
200	222.6	244.9	267.3
201	224.0	246.4	268.8
202	225.3	247.9	270.4
203	226.7	249.3	272.0
204	228.1	250.8	273.6
205	229.4	252.3	275.1
206	230.8	253.7	276.7
207	232.1	255.2	278.2
208	233.4	256.6	279.8
209	234.8	258.1	281.4
210	236.1	259.5	282.9
211	237.5	261.0	284.5
212	238.8	262.4	286.0

AC Days	5%	mean mm	95%
213	240.1	263.8	287.5
214	241.4	265.3	289.1
215	242.8	266.7	290.6
216	244.1	268.1	292.2
217	245.4	269.5	293.7
218	246.7	271.0	295.2
219	248.0	272.4	296.7
220	249.3	273.8	298.3
221	250.6	275.2	299.8
222	251.9	276.6	301.3
223	253.2	278.0	302.8
224	254.5	279.4	304.3
225	255.8	280.8	305.8
226	257.1	282.2	307.3
227	258.4	283.6	308.8
228	259.6	285.0	310.3
229	260.9	286.4	311.8
230	262.2	287.7	313.3
231	263.5	289.1	314.8
232	264.7	290.5	316.3
233	266.0	291.9	317.7
234	267.3	293.2	319.2
235	268.5	294.6	320.7
236	269.8	296.0	322.2
237	271.0	297.3	323.6
238	272.3	298.7	325.1
239	273.5	300.0	326.5
240	274.8	301.4	328.0
241	276.0	302.7	329.5
242	277.2	304.1	330.9
243	278.5	305.4	332.3
244	279.7	306.7	333.8
245	280.9	308.1	335.2
246	282.1	309.4	336.7
247	283.4	310.7	338.1
248	284.6	312.0	339.5
249	285.8	313.4	341.0
250	287.0	314.7	342.4
251	288.2	316.0	343.8
252	289.4	317.3	345.2
253	290.6	318.6	346.6
254	291.8	319.9	348.0
255	293.0	321.2	349.4

AC Days	5%	mean mm	95%
256	294.1	322.5	350.8
257	295.3	323.8	352.2
258	296.5	325.1	353.6
259	297.7	326.3	355.0
260	298.8	327.6	356.4
261	300.0	328.9	357.8
262	301.2	330.2	359.1
263	302.3	331.4	360.5
264	303.5	332.7	361.9
265	304.6	334.0	363.3
266	305.8	335.2	364.6
267	306.9	336.5	366.0
268	308.1	337.7	367.3
269	309.2	339.0	368.7
270	310.3	340.2	370.0
271	311.5	341.4	371.4
272	312.6	342.7	372.7
273	313.7	343.9	374.1
274	314.8	345.1	375.4
275	316.0	346.3	376.7
276	317.1	347.6	378.0
277	318.2	348.8	379.4
278	319.3	350.0	380.7
279	320.4	351.2	382.0
280	321.5	352.4	383.3
281	322.6	353.6	384.6
282	323.6	354.8	385.9
283	324.7	356.0	387.2
284	325.8	357.2	388.5
285	326.9	358.3	389.8
286	327.9	359.5	391.1
287	329.0	360.7	392.4
288	330.1	361.9	393.6
289	331.1	363.0	394.9
290	332.2	364.2	396.2
291	333.2	365.3	397.4
292	334.3	366.5	398.7
293	335.3	367.6	400.0
294	336.4	368.8	401.2

AXT, Tokyo

Masuda H, Shinozuka N, Okai T, Mizuno M. "Diagnosis of the Week of Pregnancy and Prognosis." *Perinatal Care* 8:719-726.

AXT = APTD * TTD

Anteroposterior Trunk Diameter multiplied by Transverse Trunk Diameter

AXT Days	- 1.5SD	mean cm^2	+ 1.5SD
140	16.4	20.6	27.1
141	16.4	20.9	27.5
142	16.5	21.3	27.9
143	16.7	21.6	28.3
144	16.8	22.0	28.8
145	16.9	22.4	29.2
146	17.1	22.7	29.6
147	17.3	23.1	30.1
148	17.5	23.5	30.5
149	17.7	23.8	31.0
150	17.9	24.2	31.4
151	18.2	24.6	31.9
152	18.4	25.0	32.4
153	18.7	25.4	32.8
154	19.0	25.8	33.3
155	19.2	26.2	33.8
156	19.5	26.6	34.2
157	19.9	27.0	34.7
158	20.2	27.4	35.2
159	20.5	27.8	35.7
160	20.8	28.2	36.2
161	21.2	28.6	36.7
162	21.5	29.0	37.2
163	21.9	29.5	37.7
164	22.3	29.9	38.2
165	22.7	30.3	38.7
166	23.0	30.7	39.2
167	23.4	31.2	39.7
168	23.8	31.6	40.2
169	24.2	32.0	40.8

AXT Days	- 1.5SD	mean cm^2	+ 1.5SD
170	24.7	32.5	41.3
171	25.1	32.9	41.8
172	25.5	33.4	42.3
173	25.9	33.8	42.9
174	26.3	34.3	43.4
175	26.8	34.7	44.0
176	27.2	35.2	44.5
177	27.7	35.7	45.1
178	28.1	36.1	45.6
179	28.6	36.6	46.2
180	29.0	37.1	46.7
181	29.5	37.6	47.3
182	29.9	38.0	47.8
183	30.4	38.5	48.4
184	30.8	39.0	49.0
185	31.3	39.5	49.6
186	31.7	40.0	50.1
187	32.2	40.4	50.7
188	32.7	40.9	51.3
189	33.1	41.4	51.9
190	33.6	41.9	52.5
191	34.1	42.4	53.0
192	34.5	42.9	53.6
193	35.0	43.4	54.2
194	35.5	43.9	54.8
195	35.9	44.4	55.4
196	36.4	45.0	56.0
197	36.9	45.5	56.6
198	37.3	46.0	57.2
199	37.8	46.5	57.8

AXT Days	- 1.5SD	mean cm^2	+ 1.5SD
200	38.2	47.0	58.4
201	38.7	47.5	59.1
202	39.2	48.1	59.7
203	39.6	48.6	60.3
204	40.1	49.1	60.9
205	40.5	49.6	61.5
206	41.0	50.2	62.1
207	41.4	50.7	62.8
208	41.9	51.2	63.4
209	42.3	51.8	64.0
210	42.8	52.3	64.6
211	43.2	52.9	65.3
212	43.7	53.4	65.9
213	44.1	53.9	66.5
214	44.6	54.5	67.2
215	45.0	55.0	67.8
216	45.4	55.6	68.4
217	45.9	56.1	69.1
218	46.3	56.7	69.7
219	46.7	57.2	70.4
220	47.2	57.8	71.0
221	47.6	58.3	71.6
222	48.0	58.9	72.3
223	48.5	59.4	72.9
224	48.9	60.0	73.6
225	49.3	60.5	74.2
226	49.7	61.1	74.9
227	50.2	61.7	75.5
228	50.6	62.2	76.2
229	51.0	62.8	76.8

AXT Days	- 1.5SD	mean cm^2	+ 1.5SD
230	51.4	63.3	77.5
231	51.8	63.9	78.1
232	52.3	64.5	78.8
233	52.7	65.0	79.4
234	53.1	65.6	80.1
235	53.5	66.2	80.7
236	53.9	66.7	81.4
237	54.4	67.3	82.0
238	54.8	67.9	82.7
239	55.2	68.4	83.3
240	55.6	69.0	84.0
241	56.1	69.6	84.6
242	56.5	70.1	85.3
243	56.9	70.7	85.9
244	57.3	71.3	86.5
245	57.8	71.8	87.2
246	58.2	72.4	87.8
247	58.6	73.0	88.5
248	59.1	73.5	89.1
249	59.5	74.1	89.8
250	60.0	74.7	90.4
251	60.4	75.2	91.1
252	60.9	75.8	91.7
253	61.3	76.3	92.3
254	61.8	76.9	93.0
255	62.3	77.5	93.6
256	62.7	78.0	94.2
257	63.2	78.6	94.9
258	63.7	79.1	95.5
259	64.2	79.7	96.1

AXT Days	- 1.5SD	mean cm^2	+ 1.5SD
260	64.7	80.3	96.8
261	65.2	80.8	97.4
262	65.7	81.4	98.0
263	66.2	81.9	98.6
264	66.7	82.5	99.3
265	67.3	83.0	99.9
266	67.8	83.6	100.5
267	68.4	84.1	101.1
268	68.9	84.7	101.7
269	69.5	85.2	102.3
270	70.1	85.8	102.9
271	70.7	86.3	103.5
272	71.3	86.9	104.1
273	71.9	87.4	104.7
274	72.5	87.9	105.3
275	73.2	88.5	105.9
276	73.8	89.0	106.5
277	74.5	89.5	107.1
278	75.2	90.1	107.7
279	75.9	90.6	108.2
280	76.6	91.1	108.8
281	77.3	91.6	109.4
282	78.0	92.1	109.9
283	78.8	92.7	110.5
284	79.6	93.2	111.1
285	80.4	93.7	111.6
286	81.2	94.2	112.2
287	82.0	94.7	112.7

Fetal Trunk Area, Osaka

Aoki M, Yamada M. "Examining Fetal Growth." *Obstetrics and Gynecology* 47:547-556, 1983.

FTA Days	- 1.5SD	mean cm^2	+ 1.5SD	FTA Days	- 1.5SD	mean cm^2	+ 1.5SD	FTA Days	- 1.5SD	mean cm^2	+ 1.5SD	FTA Days	- 1.5SD	mean cm^2	+ 1.5SD	FTA Days	- 1.5SD	mean cm^2	+ 1.5SD
98	3.8	5.6	7.4	135	13.2	16.6	20.1	172	25.9	31.7	37.6	209	41.5	50.2	58.9	246	58.1	70.1	82.1
99	4.0	5.8	7.6	136	13.3	16.9	20.5	173	26.4	32.2	38.1	210	42.1	50.8	59.5	247	58.5	70.6	82.8
100	4.2	6.0	7.8	137	13.7	17.3	20.9	174	26.6	32.6	38.6	211	42.5	51.3	60.2	248	58.8	71.1	83.4
101	4.4	6.3	8.3	138	13.9	17.6	21.4	175	27.1	33.1	39.1	212	43.0	51.8	60.7	249	59.3	71.6	83.9
102	4.6	6.5	8.5	139	14.3	18.0	21.8	176	27.5	33.6	39.8	213	43.4	52.4	61.4	250	59.8	72.2	84.7
103	4.9	6.8	8.8	140	14.7	18.4	22.2	177	28.0	34.1	40.3	214	43.8	52.9	62.1	251	60.1	72.7	85.3
104	5.2	7.1	9.1	141	14.8	18.7	22.6	178	28.2	34.5	40.8	215	44.3	53.4	62.6	252	60.6	73.2	85.8
105	5.2	7.3	9.4	142	15.2	19.1	23.0	179	28.7	35.0	41.3	216	44.7	54.0	63.3	253	61.0	73.7	86.5
106	5.5	7.6	9.7	143	15.6	19.5	23.4	180	29.1	35.5	42.0	217	45.2	54.5	63.8	254	61.3	74.2	87.1
107	5.7	7.8	9.9	144	15.9	19.9	24.0	181	29.6	36.0	42.5	218	45.6	55.0	64.5	255	61.8	74.7	87.6
108	5.9	8.1	10.4	145	16.2	20.2	24.3	182	29.9	36.5	43.1	219	46.0	55.6	65.2	256	62.2	75.2	88.3
109	6.2	8.4	10.7	146	16.4	20.6	24.8	183	30.3	36.9	43.5	220	46.5	56.1	65.7	257	62.5	75.7	88.9
110	6.5	8.7	11.0	147	16.8	21.0	25.2	184	30.7	37.4	44.2	221	47.0	56.7	66.5	258	63.0	76.2	89.4
111	6.7	8.9	11.2	148	17.2	21.4	25.6	185	31.2	37.9	44.7	222	47.5	57.2	67.0	259	63.5	76.8	90.2
112	6.8	9.2	11.6	149	17.5	21.8	26.2	186	31.5	38.4	45.3	223	47.8	57.7	67.6	260	63.8	77.3	90.8
113	7.1	9.5	11.9	150	17.9	22.2	26.6	187	32.0	38.9	45.8	224	48.3	58.3	68.4	261	64.1	77.7	91.4
114	7.4	9.8	12.2	151	18.1	22.6	27.1	188	32.4	39.4	46.5	225	48.8	58.8	68.9	262	64.6	78.2	91.9
115	7.6	10.1	12.7	152	18.5	23.0	27.5	189	32.9	39.9	47.0	226	49.2	59.4	69.6	263	64.9	78.7	92.5
116	7.9	10.4	13.0	153	18.9	23.4	27.9	190	33.2	40.4	47.6	227	49.7	59.9	70.1	264	65.3	79.2	93.2
117	8.2	10.7	13.3	154	19.2	23.8	28.5	191	33.7	40.9	48.1	228	50.1	60.4	70.8	265	65.8	79.7	93.7
118	8.3	11.0	13.7	155	19.6	24.2	28.9	192	34.1	41.4	48.8	229	50.5	61.0	71.5	266	66.1	80.2	94.3
119	8.6	11.3	14.0	156	19.9	24.7	29.5	193	34.6	41.9	49.3	230	51.0	61.5	72.0	267	66.5	80.7	95.0
120	8.9	11.6	14.3	157	20.3	25.1	29.9	194	34.9	42.4	49.9	231	51.5	62.1	72.8	268	66.7	81.1	95.5
121	9.1	11.9	14.8	158	20.6	25.5	30.5	195	35.4	42.9	50.4	232	52.0	62.6	73.3	269	67.2	81.6	96.0
122	9.4	12.2	15.1	159	21.0	25.9	30.9	196	35.8	43.4	51.1	233	52.3	63.1	73.9	270	67.6	82.1	96.7
123	9.7	12.5	15.4	160	21.5	26.4	31.4	197	36.4	44.0	51.7	234	52.8	63.7	74.7	271	67.9	82.6	97.3
124	9.8	12.8	15.8	161	21.7	26.8	31.9	198	36.7	44.5	52.3	235	53.3	64.2	75.2	272	68.3	83.0	97.7
125	10.2	13.2	16.2	162	22.1	27.2	32.3	199	37.2	45.0	52.8	236	53.6	64.7	75.8	273	68.7	83.5	98.4
126	10.5	13.5	16.5	163	22.5	27.7	33.0	200	37.6	45.5	53.5	237	54.1	65.3	76.6	274	68.9	83.9	98.9
127	10.7	13.8	17.0	164	22.9	28.1	33.4	201	38.1	46.0	54.0	238	54.6	65.8	77.1	275	69.3	84.4	99.6
128	11.0	14.1	17.3	165	23.1	28.5	33.9	202	38.5	46.6	54.7	239	55.0	66.4	77.8	276	69.7	84.8	100.0
129	11.4	14.5	17.7	166	23.6	29.0	34.4	203	39.0	47.1	55.2	240	55.5	66.9	78.3	277	70.0	85.3	100.6
130	11.5	14.8	18.1	167	23.9	29.4	35.0	204	39.4	47.6	55.9	241	55.9	67.4	79.0	278	70.3	85.7	101.2
131	11.9	15.2	18.5	168	24.4	29.9	35.5	205	39.7	48.1	56.5	242	56.2	67.9	79.6	279	70.5	86.1	101.7
132	12.2	15.5	18.8	169	24.8	30.3	35.9	206	40.3	48.7	57.1	243	56.8	68.5	80.2	280	71.0	86.6	102.2
133	12.4	15.8	19.3	170	25.1	30.8	36.5	207	40.7	49.2	57.8	244	57.2	69.0	80.9				
134	12.8	16.2	19.7	171	25.6	31.3	37.0	208	41.2	49.7	58.3	245	57.5	69.5	81.5				

Femur Length, Hadlock

Hadlock FP, Deter RL, Harrist RB, Park SK. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters." *Radiology* 152:497, 1984

FL(cm)= -3.91 + 0.427 * MA(wks) - 0.0034 * MA(wks)^2 1 Standard Deviation: ± 3 mm 5 & 95%: ± 4.94 mm

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
12	0	2.3	7.2	12.2	18	1	22.2	27.2	32.1	24	2	39.6	44.5	49.5	30	3	54.4	59.3	64.3	36	4	66.6	71.6	76.5
12	1	2.8	7.7	12.7	18	2	22.7	27.6	32.6	24	3	40.0	44.9	49.9	30	4	54.7	59.7	64.6	36	5	66.9	71.8	76.8
12	2	3.3	8.2	13.2	18	3	23.1	28.0	33.0	24	4	40.4	45.3	50.2	30	5	55.0	60.0	64.9	36	6	67.2	72.1	77.0
12	3	3.8	8.7	13.7	18	4	23.5	28.5	33.4	24	5	40.7	45.7	50.6	30	6	55.3	60.3	65.2	37	0	67.4	72.3	77.3
12	4	4.3	9.2	14.1	18	5	24.0	28.9	33.8	24	6	41.1	46.0	51.0	31	0	55.7	60.6	65.5	37	1	67.7	72.6	77.5
12	5	4.8	9.7	14.6	18	6	24.4	29.3	34.3	25	0	41.5	46.4	51.3	31	1	56.0	60.9	65.8	37	2	67.9	72.8	77.8
12	6	5.2	10.2	15.1	19	0	24.8	29.8	34.7	25	1	41.8	46.8	51.7	31	2	56.3	61.2	66.2	37	3	68.1	73.1	78.0
13	0	5.7	10.7	15.6	19	1	25.2	30.2	35.1	25	2	42.2	47.1	52.1	31	3	56.6	61.5	66.5	37	4	68.4	73.3	78.3
13	1	6.2	11.1	16.1	19	2	25.7	30.6	35.5	25	3	42.6	47.5	52.4	31	4	56.9	61.8	66.8	37	5	68.6	73.6	78.5
13	2	6.7	11.6	16.6	19	3	26.1	31.0	36.0	25	4	42.9	47.9	52.8	31	5	57.2	62.1	67.1	37	6	68.9	73.8	78.8
13	3	7.2	12.1	17.0	19	4	26.5	31.4	36.4	25	5	43.3	48.2	53.2	31	6	57.5	62.4	67.4	38	0	69.1	74.1	79.0
13	4	7.6	12.6	17.5	19	5	26.9	31.9	36.8	25	6	43.6	48.6	53.5	32	0	57.8	62.7	67.7	38	1	69.4	74.3	79.2
13	5	8.1	13.1	18.0	19	6	27.3	32.3	37.2	26	0	44.0	48.9	53.9	32	1	58.1	63.0	68.0	38	2	69.6	74.5	79.5
13	6	8.6	13.5	18.5	20	0	27.8	32.7	37.6	26	1	44.4	49.3	54.2	32	2	58.4	63.3	68.3	38	3	69.8	74.8	79.7
14	0	9.1	14.0	19.0	20	1	28.2	33.1	38.1	26	2	44.7	49.6	54.6	32	3	58.7	63.6	68.6	38	4	70.1	75.0	80.0
14	1	9.5	14.5	19.4	20	2	28.6	33.5	38.5	26	3	45.1	50.0	54.9	32	4	59.0	63.9	68.8	38	5	70.3	75.3	80.2
14	2	10.0	15.0	19.9	20	3	29.0	33.9	38.9	26	4	45.4	50.4	55.3	32	5	59.3	64.2	69.1	38	6	70.5	75.5	80.4
14	3	10.5	15.4	20.4	20	4	29.4	34.4	39.3	26	5	45.8	50.7	55.6	32	6	59.6	64.5	69.4	39	0	70.8	75.7	80.7
14	4	11.0	15.9	20.8	20	5	29.8	34.8	39.7	26	6	46.1	51.1	56.0	33	0	59.8	64.8	69.7	39	1	71.0	75.9	80.9
14	5	11.4	16.4	21.3	20	6	30.2	35.2	40.1	27	0	46.5	51.4	56.3	33	1	60.1	65.1	70.0	39	2	71.2	76.2	81.1
14	6	11.9	16.8	21.8	21	0	30.6	35.6	40.5	27	1	46.8	51.8	56.7	33	2	60.4	65.4	70.3	39	3	71.5	76.4	81.3
15	0	12.4	17.3	22.2	21	1	31.0	36.0	40.9	27	2	47.2	52.1	57.0	33	3	60.7	65.6	70.6	39	4	71.7	76.6	81.6
15	1	12.8	17.8	22.7	21	2	31.4	36.4	41.3	27	3	47.5	52.4	57.4	33	4	61.0	65.9	70.9	39	5	71.9	76.9	81.8
15	2	13.3	18.2	23.2	21	3	31.8	36.8	41.7	27	4	47.8	52.8	57.7	33	5	61.3	66.2	71.2	39	6	72.1	77.1	82.0
15	3	13.7	18.7	23.6	21	4	32.2	37.2	42.1	27	5	48.2	53.1	58.1	33	6	61.6	66.5	71.4	40	0	72.4	77.3	82.2
15	4	14.2	19.1	24.1	21	5	32.6	37.6	42.5	27	6	48.5	53.5	58.4	34	0	61.8	66.8	71.7	40	1	72.6	77.5	82.5
15	5	14.7	19.6	24.5	21	6	33.0	38.0	42.9	28	0	48.9	53.8	58.7	34	1	62.1	67.1	72.0	40	2	72.8	77.7	82.7
15	6	15.1	20.1	25.0	22	0	33.4	38.4	43.3	28	1	49.2	54.1	59.1	34	2	62.4	67.3	72.3	40	3	73.0	78.0	82.9
16	0	15.6	20.5	25.5	22	1	33.8	38.8	43.7	28	2	49.5	54.5	59.4	34	3	62.7	67.6	72.5	40	4	73.2	78.2	83.1
16	1	16.0	21.0	25.9	22	2	34.2	39.2	44.1	28	3	49.9	54.8	59.8	34	4	62.9	67.9	72.8	40	5	73.4	78.4	83.3
16	2	16.5	21.4	26.4	22	3	34.6	39.6	44.5	28	4	50.2	55.1	60.1	34	5	63.2	68.2	73.1	40	6	73.7	78.6	83.5
16	3	16.9	21.9	26.8	22	4	35.0	40.0	44.9	28	5	50.5	55.5	60.4	34	6	63.5	68.4	73.4	41	0	73.9	78.8	83.8
16	4	17.4	22.3	27.3	22	5	35.4	40.3	45.3	28	6	50.9	55.8	60.7	35	0	63.8	68.7	73.6	41	1	74.1	79.0	84.0
16	5	17.8	22.8	27.7	22	6	35.8	40.7	45.7	29	0	51.2	56.1	61.1	35	1	64.0	69.0	73.9	41	2	74.3	79.2	84.2
16	6	18.3	23.2	28.2	23	0	36.2	41.1	46.1	29	1	51.5	56.5	61.4	35	2	64.3	69.2	74.2	41	3	74.5	79.4	84.4
17	0	18.7	23.7	28.6	23	1	36.6	41.5	46.4	29	2	51.8	56.8	61.7	35	3	64.6	69.5	74.4	41	4	74.7	79.7	84.6
17	1	19.2	24.1	29.0	23	2	37.0	41.9	46.8	29	3	52.2	57.1	62.1	35	4	64.8	69.8	74.7	41	5	74.9	79.9	84.8
17	2	19.6	24.6	29.5	23	3	37.3	42.3	47.2	29	4	52.5	57.4	62.4	35	5	65.1	70.0	75.0	41	6	75.1	80.1	85.0
17	3	20.1	25.0	29.9	23	4	37.7	42.7	47.6	29	5	52.8	57.8	62.7	35	6	65.4	70.3	75.2	42	0	75.3	80.3	85.2
17	4	20.5	25.4	30.4	23	5	38.1	43.0	48.0	29	6	53.1	58.1	63.0	36	0	65.6	70.6	75.5					
17	5	20.9	25.9	30.8	23	6	38.5	43.4	48.4	30	0	53.5	58.4	63.3	36	1	65.9	70.8	75.8					
17	6	21.4	26.3	31.2	24	0	38.9	43.8	48.7	30	1	53.8	58.7	63.7	36	2	66.1	71.1	76.0					
18	0	21.8	26.7	31.7	24	1	39.2	44.2	49.1	30	2	54.1	59.0	64.0	36	3	66.4	71.3	76.3					

Femur Length, Merz

Merz E, Kim-Kern M-S, Pehl S. " Ultrasonic Mensuration of Fetal Limb Bones in the Second and Third Trimesters." *Journal of Clinical Ultrasound* 15:175, March/April 1987.

5 & 95%: (2SD/2 * 1.645)

Wk	Day	5%	Mean	95%
13	0	9.4	11.0	12.6
13	1	9.7	11.3	12.9
13	2	10.0	11.6	13.2
13	3	10.3	11.9	13.5
13	4	10.5	12.1	13.7
13	5	10.8	12.4	14.0
13	6	11.1	12.7	14.3
14	0	11.4	13.0	14.6
14	1	11.7	13.3	14.9
14	2	12.0	13.6	15.2
14	3	12.3	13.9	15.5
14	4	12.5	14.1	15.7
14	5	12.8	14.4	16.0
14	6	13.1	14.7	16.3
15	0	13.4	15.0	16.6
15	1	13.8	15.6	17.3
15	2	14.3	16.1	18.0
15	3	14.7	16.7	18.7
15	4	15.2	17.3	19.4
15	5	15.6	17.9	20.1
15	6	16.1	18.4	20.8
16	0	16.5	19.0	21.5
16	1	16.9	19.4	21.9
16	2	17.4	19.9	22.4
16	3	17.8	20.3	22.8
16	4	18.2	20.7	23.2
16	5	18.6	21.1	23.6
16	6	19.1	21.6	24.1
17	0	19.5	22.0	24.5
17	1	19.9	22.4	24.9
17	2	20.4	22.9	25.4
17	3	20.8	23.3	25.8
17	4	21.2	23.7	26.2
17	5	21.6	24.1	26.6
17	6	22.1	24.6	27.1
18	0	22.5	25.0	27.5
18	1	22.9	25.4	27.9
18	2	23.4	25.9	28.4
18	3	23.8	26.3	28.8
18	4	24.2	26.7	29.2
18	5	24.6	27.1	29.6
18	6	25.1	27.6	30.1
19	0	25.5	28.0	30.5
19	1	25.9	28.4	30.9
19	2	26.4	28.9	31.4
19	3	26.8	29.3	31.8
19	4	27.2	29.7	32.2
19	5	27.6	30.1	32.6
19	6	28.1	30.6	33.1
20	0	28.5	31.0	33.5
20	1	29.0	31.6	34.2
20	2	29.4	32.1	34.9
20	3	29.9	32.7	35.6
20	4	30.3	33.3	36.2
20	5	30.8	33.9	36.9
20	6	31.2	34.4	37.6
21	0	31.7	35.0	38.3
21	1	32.0	35.1	38.3
21	2	32.2	35.3	38.4
21	3	32.5	35.4	38.4
21	4	32.7	35.6	38.4
21	5	33.0	35.7	38.4
21	6	33.2	35.9	38.5
22	0	33.5	36.0	38.5
22	1	34.0	36.6	39.2
22	2	34.4	37.1	39.9
22	3	34.9	37.7	40.6
22	4	35.3	38.3	41.2
22	5	35.8	38.9	41.9
22	6	36.2	39.4	42.6
23	0	36.7	40.0	43.3
23	1	37.1	40.3	43.5
23	2	37.5	40.6	43.6
23	3	37.9	40.9	43.8
23	4	38.3	41.1	44.0
23	5	38.7	41.4	44.2
23	6	39.1	41.7	44.3
24	0	39.5	42.0	44.5
24	1	40.1	42.6	45.1
24	2	40.6	43.1	45.6
24	3	41.2	43.7	46.2
24	4	41.8	44.3	46.8
24	5	42.4	44.9	47.4
24	6	42.9	45.4	47.9
25	0	43.5	46.0	48.5
25	1	43.7	46.3	48.9
25	2	43.8	46.6	49.3
25	3	44.0	46.9	49.7
25	4	44.2	47.1	50.1
25	5	44.4	47.4	50.5
25	6	44.5	47.7	50.9
26	0	44.7	48.0	51.3
26	1	45.0	48.1	51.3
26	2	45.2	48.3	51.4
26	3	45.5	48.4	51.4
26	4	45.7	48.6	51.4
26	5	46.0	48.7	51.4
26	6	46.2	48.9	51.5
27	0	46.5	49.0	51.5
27	1	46.8	49.6	52.3
27	2	47.2	50.1	53.1
27	3	47.5	50.7	53.9
27	4	47.9	51.3	54.7
27	5	48.2	51.9	55.5
27	6	48.6	52.4	56.3
28	0	48.9	53.0	57.1
28	1	48.9	53.0	57.1
28	2	48.9	53.0	57.1
28	3	48.9	53.0	57.1
28	4	48.9	53.0	57.1
28	5	48.9	53.0	57.1
28	6	48.9	53.0	57.1
29	0	48.9	53.0	57.1
29	1	49.6	53.4	57.3
29	2	50.2	53.9	57.5
29	3	50.9	54.3	57.7
29	4	51.5	54.7	57.9
29	5	52.2	55.1	58.1
29	6	52.8	55.6	58.3
30	0	53.5	56.0	58.5
30	1	53.7	56.6	59.4
30	2	54.0	57.1	60.3
30	3	54.2	57.7	61.2
30	4	54.4	58.3	62.2
30	5	54.6	58.9	63.1
30	6	54.9	59.4	64.0
31	0	55.1	60.0	64.9
31	1	55.2	60.1	65.0
31	2	55.4	60.3	65.2
31	3	55.5	60.4	65.3
31	4	55.7	60.6	65.5
31	5	55.8	60.7	65.6
31	6	56.0	60.9	65.8
32	0	56.1	61.0	65.9
32	1	56.6	61.4	66.2
32	2	57.2	61.9	66.5
32	3	57.7	62.3	66.8
32	4	58.3	62.7	67.2
32	5	58.8	63.1	67.5
32	6	59.4	63.6	67.8
33	0	59.9	64.0	68.1
33	1	60.1	64.3	68.5
33	2	60.2	64.6	68.9
33	3	60.4	64.9	69.3
33	4	60.6	65.1	69.7
33	5	60.8	65.4	70.1
33	6	60.9	65.7	70.5
34	0	61.1	66.0	70.9
34	1	61.2	66.1	71.0
34	2	61.4	66.3	71.2
34	3	61.5	66.4	71.3
34	4	61.7	66.6	71.5
34	5	61.8	66.7	71.6
34	6	62.0	66.9	71.8
35	0	62.1	67.0	71.9
35	1	62.4	67.4	72.5
35	2	62.7	67.9	73.0
35	3	63.0	68.3	73.6
35	4	63.3	68.7	74.1
35	5	63.6	69.1	74.7
35	6	63.9	69.6	75.2
36	0	64.2	70.0	75.8
36	1	64.8	70.3	75.7
36	2	65.5	70.6	75.7
36	3	66.1	70.9	75.6
36	4	66.8	71.1	75.5
36	5	67.4	71.4	75.4
36	6	68.1	71.7	75.4
37	0	68.7	72.0	75.3
37	1	68.8	72.3	75.8
37	2	68.8	72.6	76.3
37	3	68.9	72.9	76.8
37	4	68.9	73.1	77.4
37	5	69.0	73.4	77.9
37	6	69.0	73.7	78.4
38	0	69.1	74.0	78.9
38	1	69.1	74.3	79.4
38	2	69.2	74.6	80.0
38	3	69.2	74.9	80.5
38	4	69.3	75.1	81.0
38	5	69.3	75.4	81.5
38	6	69.4	75.7	82.1
39	0	69.4	76.0	82.6
39	1	70.0	76.1	82.3
39	2	70.6	76.3	81.9
39	3	71.2	76.4	81.6
39	4	71.9	76.6	81.3
39	5	72.5	76.7	81.0
39	6	73.1	76.9	80.6
40	0	73.7	77.0	80.3
40	1	73.7	77.0	80.3
40	2	73.7	77.0	80.3
40	3	73.7	77.0	80.3
40	4	73.7	77.0	80.3
40	5	73.7	77.0	80.3
40	6	73.7	77.0	80.3
41	0	73.7	77.0	80.3
41	1	73.5	77.1	80.8
41	2	73.3	77.3	81.3
41	3	73.1	77.4	81.8
41	4	72.8	77.6	82.3
41	5	72.6	77.7	82.8
41	6	72.4	77.9	83.3
42	0	72.2	78.0	83.8

Femur Length, Jeanty

Jeanty P, Dramaix-Wilmet M, van Kerkem J, Petroons P, Schwers J. "Ultrasonic Evaluation of Fetal Limb Growth, Part II" *Radiology* 143:751, 1982.

FL(mm)= -36.040470 + 4.1626390 * MA(wk) - 0.0346367 * MA^2

5 & 95%: (1 SD * 1.645)

Wk	Day	5%	Mean	95%
13	0	5.6	12.2	18.8
13	1	6.1	12.7	19.3
13	2	6.6	13.1	19.7
13	3	7.0	13.6	20.2
13	4	7.5	14.1	20.7
13	5	8.0	14.5	21.1
13	6	8.4	15.0	21.6
14	0	8.9	15.4	22.0
14	1	9.3	15.9	22.5
14	2	9.8	16.4	22.9
14	3	10.2	16.8	23.4
14	4	10.7	17.3	23.8
14	5	11.1	17.7	24.3
14	6	11.6	18.2	24.7
15	0	11.3	18.6	26.0
15	1	11.7	19.1	26.4
15	2	12.1	19.5	26.8
15	3	12.6	19.9	27.3
15	4	13.0	20.4	27.7
15	5	13.5	20.8	28.2
15	6	13.9	21.3	28.6
16	0	14.3	21.7	29.0
16	1	14.8	22.1	29.5
16	2	15.2	22.6	29.9
16	3	15.7	23.0	30.3
16	4	16.1	23.4	30.8
16	5	16.5	23.9	31.2
16	6	16.9	24.3	31.6
17	0	20.3	24.7	29.1
17	1	20.7	25.1	29.6
17	2	21.1	25.6	30.0
17	3	21.6	26.0	30.4
17	4	22.0	26.4	30.8
17	5	22.4	26.8	31.3
17	6	22.8	27.2	31.7
18	0	23.2	27.7	32.1
18	1	23.7	28.1	32.5
18	2	24.1	28.5	32.9
18	3	24.5	28.9	33.3
18	4	24.9	29.3	33.7
18	5	25.3	29.7	34.2
18	6	25.7	30.1	34.6
19	0	22.7	30.5	38.4
19	1	23.1	31.0	38.8
19	2	23.5	31.4	39.2
19	3	23.9	31.8	39.6
19	4	24.3	32.2	40.0
19	5	24.7	32.6	40.4
19	6	25.1	33.0	40.8
20	0	25.5	33.4	41.2
20	1	25.9	33.8	41.6
20	2	26.3	34.1	42.0
20	3	26.7	34.5	42.4
20	4	27.1	34.9	42.8
20	5	27.5	35.3	43.2
20	6	27.9	35.7	43.6
21	0	27.4	36.1	44.8
21	1	27.7	36.5	45.2
21	2	28.1	36.9	45.6
21	3	28.5	37.3	46.0
21	4	28.9	37.6	46.4
21	5	29.3	38.0	46.8
21	6	29.7	38.4	47.1
22	0	30.0	38.8	47.5
22	1	30.4	39.1	47.9
22	2	30.8	39.5	48.3
22	3	31.2	39.9	48.6
22	4	31.5	40.3	49.0
22	5	31.9	40.6	49.4
22	6	32.3	41.0	49.8
23	0	35.1	41.4	47.6
23	1	35.5	41.7	48.0
23	2	35.8	42.1	48.4
23	3	36.2	42.5	48.7
23	4	36.6	42.8	49.1
23	5	36.9	43.2	49.5
23	6	37.3	43.6	49.8
24	0	37.6	43.9	50.2
24	1	38.0	44.3	50.5
24	2	38.4	44.6	50.9
24	3	38.7	45.0	51.2
24	4	39.1	45.3	51.6
24	5	39.4	45.7	52.0
24	6	39.8	46.0	52.3
25	0	38.4	46.4	54.4
25	1	38.7	46.7	54.7
25	2	39.0	47.1	55.1
25	3	39.4	47.4	55.4
25	4	39.7	47.8	55.8
25	5	40.1	48.1	56.1
25	6	40.4	48.4	56.5
26	0	40.8	48.8	56.8
26	1	41.1	49.1	57.1
26	2	41.4	49.4	57.5
26	3	41.8	49.8	57.8
26	4	42.1	50.1	58.1
26	5	42.4	50.4	58.5
26	6	42.7	50.8	58.8
27	0	45.0	51.1	57.2
27	1	45.4	51.4	57.5
27	2	45.7	51.8	57.8
27	3	46.0	52.1	58.1
27	4	46.3	52.4	58.5
27	5	46.7	52.7	58.8
27	6	47.0	53.0	59.1
28	0	47.3	53.4	59.4
28	1	47.6	53.7	59.7
28	2	47.9	54.0	60.0
28	3	48.2	54.3	60.4
28	4	48.6	54.6	60.7
28	5	48.9	54.9	61.0
28	6	49.2	55.2	61.3
29	0	49.1	55.5	62.0
29	1	49.4	55.9	62.3
29	2	49.7	56.2	62.7
29	3	50.0	56.5	63.0
29	4	50.3	56.8	63.3
29	5	50.6	57.1	63.6
29	6	50.9	57.4	63.9
30	0	51.2	57.7	64.2
30	1	51.5	58.0	64.5
30	2	51.8	58.3	64.8
30	3	52.1	58.6	65.0
30	4	52.3	58.8	65.3
30	5	52.6	59.1	65.6
30	6	52.9	59.4	65.9
31	0	52.8	59.7	66.7
31	1	53.1	60.0	67.0
31	2	53.3	60.3	67.2
31	3	53.6	60.6	67.5
31	4	53.9	60.9	67.8
31	5	54.2	61.1	68.1
31	6	54.5	61.4	68.4
32	0	54.7	61.7	68.6
32	1	55.0	62.0	68.9
32	2	55.3	62.2	69.2
32	3	55.6	62.5	69.5
32	4	55.8	62.8	69.7
32	5	56.1	63.1	70.0
32	6	56.4	63.3	70.3
33	0	56.5	63.6	70.7
33	1	56.7	63.9	71.0
33	2	57.0	64.1	71.3
33	3	57.3	64.4	71.5
33	4	57.5	64.7	71.8
33	5	57.8	64.9	72.1
33	6	58.1	65.2	72.3
34	0	58.3	65.4	72.6
34	1	58.6	65.7	72.8
34	2	58.8	66.0	73.1
34	3	59.1	66.2	73.4
34	4	59.3	66.5	73.6
34	5	59.6	66.7	73.9
34	6	59.8	67.0	74.1
35	0	61.3	67.2	73.1
35	1	61.6	67.5	73.4
35	2	61.8	67.7	73.6
35	3	62.1	68.0	73.9
35	4	62.3	68.2	74.1
35	5	62.6	68.4	74.3
35	6	62.8	68.7	74.6
36	0	63.0	68.9	74.8
36	1	63.3	69.2	75.1
36	2	63.5	69.4	75.3
36	3	63.7	69.6	75.5
36	4	64.0	69.9	75.8
36	5	64.2	70.1	76.0
36	6	64.4	70.3	76.2
37	0	63.7	70.6	77.5
37	1	63.9	70.8	77.7
37	2	64.1	71.0	77.9
37	3	64.3	71.2	78.1
37	4	64.6	71.5	78.4
37	5	64.8	71.7	78.6
37	6	65.0	71.9	78.8
38	0	65.2	72.1	79.0
38	1	65.4	72.3	79.2
38	2	65.7	72.6	79.5
38	3	65.9	72.8	79.7
38	4	66.1	73.0	79.9
38	5	66.3	73.2	80.1
38	6	66.5	73.4	80.3
39	0	63.8	73.6	83.5
39	1	64.0	73.8	83.7
39	2	64.2	74.0	83.9
39	3	64.4	74.2	84.1
39	4	64.6	74.4	84.3
39	5	64.8	74.6	84.5
39	6	65.0	74.8	84.7
40	0	65.2	75.0	84.9

Femur Length, Hansmann

Hansmann M, Hackelöer B-J, Staudach A. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, 1985.

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
12	0	4.0	8.0	13.0	17	5	20.1	24.4	29.1	23	3	35.9	40.3	44.9	29	1	50.3	54.3	59.3	34	6	61.7	66.7	70.7
12	1	4.3	8.4	13.4	17	6	20.6	24.7	29.6	23	4	36.1	40.7	45.1	29	2	50.6	54.6	59.6	35	0	62.0	67.0	71.0
12	2	4.6	8.9	13.9	18	0	21.0	25.0	30.0	23	5	36.4	41.1	45.4	29	3	50.9	54.9	59.9	35	1	62.3	67.1	71.3
12	3	4.9	9.3	14.3	18	1	21.4	25.4	30.4	23	6	36.7	41.6	45.7	29	4	51.1	55.1	60.1	35	2	62.6	67.3	71.6
12	4	5.1	9.7	14.7	18	2	21.9	25.9	30.9	24	0	37.0	42.0	46.0	29	5	51.4	55.4	60.4	35	3	62.9	67.4	71.9
12	5	5.4	10.1	15.1	18	3	22.3	26.3	31.3	24	1	37.4	42.3	46.4	29	6	51.7	55.7	60.7	35	4	63.1	67.6	72.1
12	6	5.7	10.6	15.6	18	4	22.7	26.7	31.7	24	2	37.9	42.6	46.9	30	0	52.0	56.0	61.0	35	5	63.4	67.7	72.4
13	0	6.0	11.0	16.0	18	5	23.1	27.1	32.1	24	3	38.3	42.9	47.3	30	1	52.3	56.4	61.3	35	6	63.7	67.9	72.7
13	1	6.4	11.4	16.3	18	6	23.6	27.6	32.6	24	4	38.7	43.1	47.7	30	2	52.6	56.9	61.6	36	0	64.0	68.0	73.0
13	2	6.9	11.9	16.6	19	0	24.0	28.0	33.0	24	5	39.1	43.4	48.1	30	3	52.9	57.3	61.9	36	1	64.1	68.3	73.1
13	3	7.3	12.3	16.9	19	1	24.3	28.4	33.4	24	6	39.6	43.7	48.6	30	4	53.1	57.7	62.1	36	2	64.3	68.6	73.3
13	4	7.7	12.7	17.1	19	2	24.6	28.9	33.9	25	0	40.0	44.0	49.0	30	5	53.4	58.1	62.4	36	3	64.4	68.9	73.4
13	5	8.1	13.1	17.4	19	3	24.9	29.3	34.3	25	1	40.3	44.4	49.3	30	6	53.7	58.6	62.7	36	4	64.6	69.1	73.6
13	6	8.6	13.6	17.7	19	4	25.1	29.7	34.7	25	2	40.6	44.9	49.6	31	0	54.0	59.0	63.0	36	5	64.7	69.4	73.7
14	0	9.0	14.0	18.0	19	5	25.4	30.1	35.1	25	3	40.9	45.3	49.9	31	1	54.3	59.3	63.3	36	6	64.9	69.7	73.9
14	1	9.4	14.4	18.4	19	6	25.7	30.6	35.6	25	4	41.1	45.7	50.1	31	2	54.6	59.6	63.6	37	0	65.0	70.0	74.0
14	2	9.9	14.9	18.9	20	0	26.0	31.0	36.0	25	5	41.4	46.1	50.4	31	3	54.9	59.9	63.9	37	1	65.3	70.1	74.3
14	3	10.3	15.3	19.3	20	1	26.4	31.4	36.3	25	6	41.7	46.6	50.7	31	4	55.1	60.1	64.1	37	2	65.6	70.3	74.6
14	4	10.7	15.7	19.7	20	2	26.9	31.9	36.6	26	0	42.0	47.0	51.0	31	5	55.4	60.4	64.4	37	3	65.9	70.4	74.9
14	5	11.1	16.1	20.1	20	3	27.3	32.3	36.9	26	1	42.4	47.3	51.4	31	6	55.7	60.7	64.7	37	4	66.1	70.6	75.1
14	6	11.6	16.6	20.6	20	4	27.7	32.7	37.1	26	2	42.9	47.6	51.9	32	0	56.0	61.0	65.0	37	5	66.4	70.7	75.4
15	0	12.0	17.0	21.0	20	5	28.1	33.1	37.4	26	3	43.3	47.9	52.3	32	1	56.3	61.3	65.3	37	6	66.7	70.9	75.7
15	1	12.4	17.4	21.4	20	6	28.6	33.6	37.7	26	4	43.7	48.1	52.7	32	2	56.6	61.6	65.6	38	0	67.0	71.0	76.0
15	2	12.9	17.9	21.9	21	0	29.0	34.0	38.0	26	5	44.1	48.4	53.1	32	3	56.9	61.9	65.9	38	1	67.1	71.3	76.1
15	3	13.3	18.3	22.3	21	1	29.4	34.3	38.4	26	6	44.6	48.7	53.6	32	4	57.1	62.1	66.1	38	2	67.3	71.6	76.3
15	4	13.7	18.7	22.7	21	2	29.9	34.6	38.9	27	0	45.0	49.0	54.0	32	5	57.4	62.4	66.4	38	3	67.4	71.9	76.4
15	5	14.1	19.1	23.1	21	3	30.3	34.9	39.3	27	1	45.3	49.4	54.3	32	6	57.7	62.7	66.7	38	4	67.6	72.1	76.6
15	6	14.6	19.6	23.6	21	4	30.7	35.1	39.7	27	2	45.6	49.9	54.6	33	0	58.0	63.0	67.0	38	5	67.7	72.4	76.7
16	0	15.0	20.0	24.0	21	5	31.1	35.4	40.1	27	3	45.9	50.3	54.9	33	1	58.3	63.3	67.3	38	6	67.9	72.7	76.9
16	1	15.4	20.4	24.4	21	6	31.6	35.7	40.6	27	4	46.1	50.7	55.1	33	2	58.6	63.6	67.6	39	0	68.0	73.0	77.0
16	2	15.9	20.9	24.9	22	0	32.0	36.0	41.0	27	5	46.4	51.1	55.4	33	3	58.9	63.9	67.9	39	1	68.3	73.1	77.3
16	3	16.3	21.3	25.3	22	1	32.4	36.4	41.4	27	6	46.7	51.6	55.7	33	4	59.1	64.1	68.1	39	2	68.6	73.3	77.6
16	4	16.7	21.7	25.7	22	2	32.9	36.9	41.9	28	0	47.0	52.0	56.0	33	5	59.4	64.4	68.4	39	3	68.9	73.4	77.9
16	5	17.1	22.1	26.1	22	3	33.3	37.3	42.3	28	1	47.4	52.3	56.4	33	6	59.7	64.7	68.7	39	4	69.1	73.6	78.1
16	6	17.6	22.6	26.6	22	4	33.7	37.7	42.7	28	2	47.9	52.6	56.9	34	0	60.0	65.0	69.0	39	5	69.4	73.7	78.4
17	0	18.0	23.0	27.0	22	5	34.1	38.1	43.1	28	3	48.3	52.9	57.3	34	1	60.3	65.3	69.3	39	6	69.7	73.9	78.7
17	1	18.4	23.3	27.4	22	6	34.6	38.6	43.6	28	4	48.7	53.1	57.7	34	2	60.6	65.6	69.6	40	0	70.0	74.0	79.0
17	2	18.9	23.6	27.9	23	0	35.0	39.0	44.0	28	5	49.1	53.4	58.1	34	3	60.9	65.9	69.9					
17	3	19.3	23.9	28.3	23	1	35.3	39.4	44.3	28	6	49.6	53.7	58.6	34	4	61.1	66.1	70.1					
17	4	19.7	24.1	28.7	23	2	35.6	39.9	44.6	29	0	50.0	54.0	59.0	34	5	61.4	66.4	70.4					

Femur Length, Tokyo

Masuda H, Shinozuka N, Okai T, Mizuno M. "Diagnosis of the Week of Pregnancy and Prognosis." *Perinatal Care* 8:719-726.

FL Days	- 1.5SD	mean mm	+ 1.5SD	FL Days	- 1.5SD	mean mm	+ 1.5SD	FL Days	- 1.5SD	mean mm	+ 1.5SD	FL Days	- 1.5SD	mean mm	+ 1.5SD	FL Days	- 1.5SD	mean mm	+ 1.5SD
140	27.2	32.3	34.0	170	36.6	41.6	46.4	200	45.3	51.0	57.0	230	53.3	59.8	65.7	260	60.6	67.0	72.4
141	27.5	32.6	34.5	171	36.9	41.9	46.8	201	45.6	51.3	57.3	231	53.6	60.1	65.9	261	60.8	67.2	72.6
142	27.8	32.9	34.9	172	37.2	42.2	47.2	202	45.9	51.6	57.6	232	53.8	60.4	66.2	262	61.0	67.4	72.7
143	28.1	33.2	35.4	173	37.5	42.5	47.6	203	46.1	51.9	57.9	233	54.1	60.6	66.4	263	61.3	67.6	72.9
144	28.4	33.5	35.8	174	37.8	42.8	47.9	204	46.4	52.2	58.3	234	54.4	60.9	66.7	264	61.5	67.8	73.1
145	28.8	33.8	36.2	175	38.1	43.1	48.3	205	46.7	52.5	58.6	235	54.6	61.2	66.9	265	61.7	68.0	73.3
146	29.1	34.1	36.7	176	38.4	43.5	48.7	206	47.0	52.9	58.9	236	54.9	61.4	67.2	266	61.9	68.2	73.5
147	29.4	34.4	37.1	177	38.7	43.8	49.1	207	47.2	53.2	59.2	237	55.1	61.7	67.4	267	62.1	68.3	73.6
148	29.7	34.7	37.5	178	38.9	44.1	49.4	208	47.5	53.5	59.5	238	55.3	61.9	67.7	268	62.4	68.5	73.8
149	30.0	35.0	37.9	179	39.2	44.4	49.8	209	47.8	53.8	59.8	239	55.6	62.2	67.9	269	62.6	68.7	74.0
150	30.4	35.3	38.4	180	39.5	44.7	50.2	210	48.1	54.1	60.1	240	55.8	62.4	68.1	270	62.8	68.9	74.1
151	30.7	35.6	38.8	181	39.8	45.0	50.5	211	48.3	54.4	60.4	241	56.1	62.7	68.4	271	63.0	69.0	74.3
152	31.0	35.9	39.2	182	40.1	45.4	50.9	212	48.6	54.7	60.7	242	56.3	63.0	68.6	272	63.2	69.2	74.5
153	31.3	36.2	39.6	183	40.4	45.7	51.2	213	48.9	55.0	61.0	243	56.6	63.2	68.8	273	63.4	69.3	74.6
154	31.6	36.5	40.0	184	40.7	46.0	51.6	214	49.1	55.3	61.3	244	56.8	63.4	69.0	274	63.7	69.5	74.8
155	31.9	36.9	40.5	185	41.0	46.3	51.9	215	49.4	55.6	61.6	245	57.1	63.7	69.3	275	63.9	69.7	74.9
156	32.2	37.2	40.9	186	41.3	46.6	52.3	216	49.7	55.8	61.9	246	57.3	63.9	69.5	276	64.1	69.8	75.1
157	32.6	37.5	41.3	187	41.6	46.9	52.6	217	49.9	56.1	62.1	247	57.5	64.2	69.7	277	64.3	69.9	75.3
158	32.9	37.8	41.7	188	41.9	47.3	53.0	218	50.2	56.4	62.4	248	57.8	64.4	69.9	278	64.5	70.1	75.4
159	33.2	38.1	42.1	189	42.2	47.6	53.3	219	50.5	56.7	62.7	249	58.0	64.6	70.1	279	64.7	70.2	75.5
160	33.5	38.4	42.5	190	42.5	47.9	53.7	220	50.7	57.0	63.0	250	58.3	64.9	70.4	280	64.9	70.4	75.7
161	33.8	38.7	42.9	191	42.7	48.2	54.0	221	51.0	57.3	63.3	251	58.5	65.1	70.6	281	65.1	70.5	75.8
162	34.1	39.0	43.3	192	43.0	48.5	54.4	222	51.3	57.6	63.5	252	58.7	65.3	70.8	282	65.3	70.6	76.0
163	34.4	39.3	43.7	193	43.3	48.8	54.7	223	51.5	57.9	63.8	253	59.0	65.5	71.0	283	65.5	70.7	76.1
164	34.7	39.7	44.1	194	43.6	49.1	55.0	224	51.8	58.2	64.1	254	59.2	65.8	71.2	284	65.7	70.8	76.2
165	35.0	40.0	44.5	195	43.9	49.5	55.4	225	52.1	58.4	64.4	255	59.4	66.0	71.4	285	65.9	71.0	76.4
166	35.3	40.3	44.9	196	44.2	49.8	55.7	226	52.3	58.7	64.6	256	59.7	66.2	71.6	286	66.1	71.1	76.5
167	35.6	40.6	45.3	197	44.5	50.1	56.0	227	52.6	59.0	64.9	257	59.9	66.4	71.8	287	66.3	71.2	76.6
168	35.9	40.9	45.7	198	44.7	50.4	56.3	228	52.8	59.3	65.2	258	60.1	66.6	72.0				
169	36.2	41.2	46.0	199	45.0	50.7	56.7	229	53.1	59.5	65.4	259	60.3	66.8	72.2				

Femur Length, Osaka

Aoki M, Yamada M. "Examining Fetal Growth." *Obstetrics and Gynecology* 47:547-556, 1983.

FL Days	- 1.5SD	mean mm	+ 1.5SD	FL Days	- 1.5SD	mean mm	+ 1.5SD	FL Days	- 1.5SD	mean mm	+ 1.5SD	FL Days	- 1.5SD	mean mm	+ 1.5SD	FL Days	- 1.5SD	mean mm	+ 1.5SD
91	6.3	9.4	12.6	129	22.5	25.9	29.4	167	36.7	40.4	44.2	205	48.6	52.8	57.0	243	58.6	63.1	67.6
92	6.7	9.8	13.0	130	22.9	26.3	29.8	168	37.1	40.8	44.6	206	48.9	53.1	57.3	244	58.9	63.4	67.9
93	7.2	10.3	13.5	131	23.3	26.7	30.2	169	37.2	41.1	45.0	207	49.2	53.4	57.6	245	59.1	63.6	68.1
94	7.6	10.7	13.9	132	23.7	27.1	30.6	170	37.6	41.5	45.4	208	49.5	53.7	57.9	246	59.4	63.9	68.4
95	8.1	11.2	14.4	133	23.9	27.5	31.1	171	37.9	41.8	45.7	209	49.8	54.0	58.2	247	59.6	64.1	68.6
96	8.6	11.7	14.9	134	24.3	27.9	31.5	172	38.3	42.2	46.1	210	50.1	54.3	58.5	248	59.8	64.3	68.8
97	8.8	12.1	15.4	135	24.7	28.3	31.9	173	38.6	42.5	46.4	211	50.4	54.6	58.8	249	60.1	64.6	69.1
98	9.3	12.6	15.9	136	25.1	28.7	32.3	174	38.9	42.8	46.7	212	50.7	54.9	59.1	250	60.3	64.8	69.3
99	9.7	13.0	16.3	137	25.5	29.1	32.7	175	39.3	43.2	47.1	213	51.0	55.2	59.4	251	60.5	65.0	69.5
100	10.2	13.5	16.8	138	25.9	29.5	33.1	176	39.6	43.5	47.4	214	51.2	55.4	59.6	252	60.8	65.3	69.8
101	10.6	13.9	17.2	139	26.3	29.9	33.5	177	40.0	43.9	47.8	215	51.5	55.7	59.9	253	61.0	65.5	70.0
102	11.1	14.4	17.7	140	26.7	30.3	33.9	178	40.3	44.2	48.1	216	51.8	56.0	60.2	254	61.2	65.7	70.2
103	11.5	14.8	18.1	141	27.1	30.7	34.3	179	40.6	44.5	48.4	217	52.1	56.3	60.5	255	61.5	66.0	70.5
104	12.0	15.3	18.6	142	27.5	31.1	34.7	180	41.0	44.9	48.8	218	52.4	56.6	60.8	256	61.7	66.2	70.7
105	12.4	15.7	19.0	143	27.9	31.5	35.1	181	41.3	45.2	49.1	219	52.7	56.9	61.1	257	61.9	66.4	70.9
106	12.8	16.1	19.4	144	28.3	31.9	35.5	182	41.7	45.6	49.5	220	52.9	57.1	61.3	258	62.1	66.6	71.1
107	13.3	16.6	19.9	145	28.7	32.3	35.9	183	42.0	45.9	49.8	221	53.2	57.4	61.6	259	62.3	66.9	71.6
108	13.7	17.0	20.3	146	29.1	32.7	36.3	184	42.3	46.2	50.1	222	53.5	57.7	61.9	260	62.5	67.1	71.8
109	14.2	17.5	20.8	147	29.4	33.0	36.6	185	42.6	46.5	50.4	223	53.7	58.0	62.4	261	62.7	67.3	72.0
110	14.6	17.9	21.2	148	29.8	33.4	37.0	186	43.0	46.9	50.8	224	53.9	58.2	62.6	262	62.9	67.5	72.2
111	15.0	18.3	21.6	149	30.2	33.8	37.4	187	43.2	47.2	51.3	225	54.2	58.5	62.9	263	63.1	67.7	72.4
112	15.5	18.8	22.1	150	30.6	34.2	37.8	188	43.5	47.5	51.6	226	54.5	58.8	63.2	264	63.3	67.9	72.6
113	15.9	19.2	22.5	151	30.9	34.6	38.4	189	43.8	47.8	51.9	227	54.7	59.0	63.4	265	63.6	68.2	72.9
114	16.3	19.6	22.9	152	31.2	34.9	38.7	190	44.2	48.2	52.3	228	55.0	59.3	63.7	266	63.8	68.4	73.1
115	16.7	20.1	23.6	153	31.6	35.3	39.1	191	44.5	48.5	52.6	229	55.3	59.6	64.0	267	64.0	68.6	73.3
116	17.1	20.5	24.0	154	32.0	35.7	39.5	192	44.8	48.8	52.9	230	55.5	59.8	64.2	268	64.2	68.8	73.5
117	17.5	20.9	24.4	155	32.4	36.1	39.9	193	45.1	49.1	53.2	231	55.8	60.1	64.5	269	64.4	69.0	73.7
118	17.9	21.3	24.8	156	32.7	36.4	40.2	194	45.4	49.4	53.5	232	56.1	60.4	64.8	270	64.6	69.2	73.9
119	18.4	21.8	25.3	157	33.1	36.8	40.6	195	45.7	49.7	53.8	233	56.3	60.6	65.0	271	64.8	69.4	74.1
120	18.8	22.2	25.7	158	33.5	37.2	41.0	196	46.1	50.1	54.2	234	56.6	60.9	65.3	272	65.0	69.6	74.3
121	19.2	22.6	26.1	159	33.8	37.5	41.3	197	46.4	50.4	54.5	235	56.8	61.1	65.5	273	65.2	69.8	74.5
122	19.6	23.0	26.5	160	34.2	37.9	41.7	198	46.7	50.7	54.8	236	57.1	61.4	65.8	274	65.4	70.0	74.7
123	20.0	23.4	26.9	161	34.6	38.3	42.1	199	47.0	51.0	55.1	237	57.3	61.6	66.0	275	65.6	70.2	74.9
124	20.5	23.9	27.4	162	34.9	38.6	42.4	200	47.3	51.3	55.4	238	57.6	61.9	66.3	276	65.8	70.4	75.1
125	20.9	24.3	27.8	163	35.3	39.0	42.8	201	47.6	51.6	55.7	239	57.8	62.1	66.5	277	65.8	70.6	75.4
126	21.3	24.7	28.2	164	35.6	39.3	43.1	202	47.9	51.9	56.0	240	58.1	62.4	66.8	278	66.0	70.8	75.6
127	21.7	25.1	28.6	165	36.0	39.7	43.5	203	48.2	52.2	56.3	241	58.1	62.6	67.1	279	66.2	71.0	75.8
128	22.1	25.5	29.0	166	36.4	40.1	43.9	204	48.5	52.5	56.6	242	58.4	62.9	67.4	280	66.4	71.2	76.0

Femur Length, JSUM

Japan Society of Ultrasonics in Medicine. "Standardization of Fetometry and Official Announcement of Diagnostic Guidelines." *J. Med. Ultrasonics* 28:844-872, 2001.

FL Days	- 1.5SD	mean mm	+ 1.5SD	FL Days	- 1.5SD	mean mm	+ 1.5SD	FL Days	- 1.5SD	mean mm	+ 1.5SD	FL Days	- 1.5SD	mean mm	+ 1.5SD	FL Days	- 1.5SD	mean mm	+ 1.5SD
112	16.2	20.1	24.1	149	29.4	33.6	37.8	186	41.8	46.3	50.8	223	52.7	57.5	62.2	260	61.2	66.2	71.2
113	16.6	20.5	24.4	150	29.7	34.0	38.2	187	42.2	46.6	51.1	224	53.0	57.8	62.5	261	61.4	66.4	71.4
114	16.9	20.8	24.8	151	30.1	34.3	38.6	188	42.5	47.0	51.5	225	53.3	58.1	62.8	262	61.5	66.6	71.6
115	17.3	21.2	25.2	152	30.4	34.7	38.9	189	42.8	47.3	51.8	226	53.5	58.3	63.1	263	61.7	66.8	71.8
116	17.6	21.6	25.6	153	30.8	35.0	39.3	190	43.1	47.6	52.1	227	53.8	58.6	63.4	264	61.9	67.0	72.0
117	18.0	22.0	25.9	154	31.1	35.4	39.7	191	43.4	48.0	52.5	228	54.0	58.8	63.6	265	62.1	67.2	72.2
118	18.4	22.3	26.3	155	31.5	35.8	40.0	192	43.8	48.3	52.8	229	54.3	59.1	63.9	266	62.3	67.4	72.4
119	18.7	22.7	26.7	156	31.8	36.1	40.4	193	44.1	48.6	53.1	230	54.5	59.3	64.2	267	62.5	67.6	72.6
120	19.1	23.1	27.1	157	32.2	36.5	40.7	194	44.4	48.9	53.4	231	54.8	59.6	64.5	268	62.6	67.7	72.8
121	19.4	23.4	27.4	158	32.5	36.8	41.1	195	44.7	49.3	53.8	232	55.0	59.9	64.7	269	62.8	67.9	73.0
122	19.8	23.8	27.8	159	32.9	37.2	41.5	196	45.0	49.6	54.1	233	55.3	60.1	65.0	270	62.9	68.1	73.2
123	20.1	24.2	28.2	160	33.2	37.5	41.8	197	45.3	49.9	54.4	234	55.5	60.4	65.2	271	63.1	68.3	73.3
124	20.5	24.6	28.6	161	33.6	37.9	42.2	198	45.6	50.2	54.7	235	55.8	60.6	65.5	272	63.3	68.4	73.5
125	20.8	24.9	29.0	162	33.9	38.2	42.5	199	45.9	50.5	55.1	236	56.0	60.9	65.8	273	63.4	68.6	73.7
126	21.2	25.3	29.4	163	34.2	38.6	42.9	200	46.2	50.8	55.4	237	56.3	61.1	66.0	274	63.6	68.7	73.9
127	21.5	25.7	29.7	164	34.6	38.9	43.2	201	46.5	51.1	55.7	238	56.5	61.4	66.3	275	63.7	68.9	74.0
128	21.9	26.0	30.1	165	34.9	39.3	43.6	202	46.8	51.4	56.0	239	56.8	61.6	66.5	276	63.9	69.0	74.2
129	22.2	26.4	30.5	166	35.3	39.6	43.9	203	47.1	51.7	56.4	240	57.0	61.9	66.8	277	64.0	69.2	74.3
130	22.6	26.7	30.8	167	35.6	40.0	44.3	204	47.4	52.0	56.7	241	57.2	62.1	67.0	278	64.1	69.3	74.5
131	23.0	27.1	31.2	168	36.0	40.3	44.7	205	47.7	52.3	57.0	242	57.4	62.3	67.2	279	64.3	69.5	74.6
132	23.3	27.4	31.6	169	36.3	40.6	45.0	206	48.0	52.6	57.3	243	57.7	62.5	67.5	280	64.4	69.6	74.8
133	23.7	27.8	31.9	170	36.6	41.0	45.4	207	48.3	52.9	57.6	244	57.9	62.8	67.7	281	64.6	69.7	74.9
134	24.0	28.2	32.3	171	36.9	41.3	45.7	208	48.6	53.2	57.9	245	58.1	63.0	68.0	282	64.7	69.9	75.1
135	24.4	28.5	32.7	172	37.3	41.7	46.1	209	48.9	53.5	58.2	246	58.3	63.2	68.2	283	64.8	70.0	75.2
136	24.8	28.9	33.0	173	37.6	42.0	46.4	210	49.2	53.8	58.5	247	58.6	63.5	68.4	284	65.0	70.2	75.3
137	25.1	29.3	33.4	174	37.9	42.4	46.8	211	49.4	54.1	58.7	248	58.8	63.7	68.6	285	65.1	70.3	75.5
138	25.5	29.7	33.8	175	38.3	42.7	47.1	212	49.7	54.4	59.0	249	59.0	63.9	68.9	286	65.2	70.5	75.6
139	25.8	30.0	34.2	176	38.6	43.0	47.5	213	50.0	54.7	59.3	250	59.2	64.1	69.1	287	65.4	70.6	75.8
140	26.2	30.4	34.5	177	38.9	43.4	47.8	214	50.3	54.9	59.6	251	59.4	64.4	69.3	288	65.5	70.7	75.9
141	26.6	30.8	34.9	178	39.3	43.7	48.1	215	50.5	55.2	59.9	252	59.7	64.6	69.6	289	65.6	70.8	76.0
142	26.9	31.1	35.3	179	39.6	44.0	48.5	216	50.8	55.5	60.2	253	59.8	64.8	69.8	290	65.7	70.9	76.2
143	27.3	31.5	35.6	180	39.9	44.3	48.8	217	51.1	55.8	60.5	254	60.0	65.0	70.0	291	65.8	71.1	76.3
144	27.6	31.8	36.0	181	40.2	44.7	49.2	218	51.4	56.1	60.8	255	60.2	65.2	70.2	292	65.9	71.2	76.4
145	28.0	32.2	36.4	182	40.6	45.0	49.5	219	51.6	56.4	61.1	256	60.4	65.4	70.4	293	66.0	71.3	76.5
146	28.3	32.5	36.7	183	40.9	45.3	49.8	220	51.9	56.7	61.4	257	60.6	65.6	70.6	294	66.1	71.4	76.7
147	28.7	32.9	37.1	184	41.2	45.7	50.2	221	52.2	56.9	61.7	258	60.8	65.8	70.8				
148	29.0	33.3	37.5	185	41.5	46.0	50.5	222	52.5	57.2	62.0	259	61.0	66.0	71.0				

Femur Length, ASUM

ASUM; Australian Society of Ultrasound Medicine (ASUM) - *Policy on Obstetric Exams*, 1998.

FL Days	5%	mean mm	95%	FL Days	5%	mean mm	95%	FL Days	5%	mean mm	95%	FL Days	5%	mean mm	95%	FL Days	5%	mean mm	95%
77	6.4	8.0	9.6	120	22.0	25.4	28.8	163	39.7	43.6	47.4	206	51.6	56.3	61.0	249	63.2	68.1	73.1
78	6.6	8.3	10.0	121	22.3	25.9	29.4	164	40.1	43.9	47.6	207	52.0	56.7	61.5	250	63.5	68.4	73.4
79	6.8	8.6	10.3	122	22.6	26.3	29.9	165	40.5	44.1	47.8	208	52.3	57.1	62.0	251	63.8	68.7	73.6
80	7.0	8.9	10.7	123	23.0	26.7	30.5	166	40.9	44.4	48.0	209	52.7	57.6	62.4	252	64.1	69.0	73.9
81	7.3	9.1	11.0	124	23.3	27.1	31.0	167	41.3	44.7	48.1	210	53.1	58.0	62.9	253	64.6	69.4	74.2
82	7.5	9.4	11.4	125	23.6	27.6	31.6	168	41.7	45.0	48.3	211	53.3	58.1	63.0	254	65.2	69.9	74.6
83	7.7	9.7	11.7	126	23.9	28.0	32.1	169	42.0	45.4	48.8	212	53.5	58.3	63.1	255	65.7	70.3	74.9
84	7.9	10.0	12.1	127	24.2	28.3	32.4	170	42.3	45.9	49.4	213	53.7	58.4	63.2	256	66.2	70.7	75.2
85	8.1	10.1	12.2	128	24.5	28.6	32.7	171	42.6	46.3	49.9	214	53.9	58.6	63.3	257	66.8	71.1	75.5
86	8.2	10.3	12.3	129	24.7	28.9	33.0	172	43.0	46.7	50.5	215	54.1	58.7	63.4	258	67.3	71.6	75.8
87	8.4	10.4	12.5	130	25.0	29.1	33.3	173	43.3	47.1	51.0	216	54.3	58.9	63.4	259	67.9	72.0	76.1
88	8.5	10.6	12.6	131	25.3	29.4	33.5	174	43.6	47.6	51.6	217	54.5	59.0	63.5	260	68.0	72.1	76.3
89	8.7	10.7	12.8	132	25.6	29.7	33.8	175	43.9	48.0	52.1	218	54.8	59.4	64.0	261	68.1	72.3	76.5
90	8.8	10.9	12.9	133	25.9	30.0	34.1	176	44.0	48.1	52.3	219	55.2	59.9	64.5	262	68.1	72.4	76.7
91	8.9	11.0	13.1	134	26.1	30.3	34.5	177	44.2	48.3	52.4	220	55.6	60.3	65.0	263	68.2	72.6	76.9
92	9.5	11.6	13.7	135	26.2	30.6	34.9	178	44.3	48.4	52.5	221	56.0	60.7	65.5	264	68.3	72.7	77.1
93	10.0	12.1	14.3	136	26.4	30.9	35.3	179	44.5	48.6	52.7	222	56.3	61.1	66.0	265	68.4	72.9	77.3
94	10.5	12.7	14.9	137	26.6	31.1	35.7	180	44.6	48.7	52.8	223	56.7	61.6	66.4	266	68.5	73.0	77.5
95	11.0	13.3	15.6	138	26.7	31.4	36.1	181	44.7	48.9	53.0	224	57.1	62.0	66.9	267	68.7	73.3	77.9
96	11.5	13.9	16.2	139	26.9	31.7	36.5	182	44.9	49.0	53.1	225	57.7	62.4	67.1	268	68.9	73.6	78.2
97	12.0	14.4	16.8	140	27.1	32.0	36.9	183	45.0	49.1	53.3	226	58.4	62.9	67.3	269	69.2	73.9	78.6
98	12.5	15.0	17.5	141	27.4	32.3	37.2	184	45.2	49.3	53.4	227	59.1	63.3	67.5	270	69.4	74.1	78.9
99	12.8	15.3	17.8	142	27.6	32.6	37.5	185	45.3	49.4	53.5	228	59.7	63.7	67.7	271	69.6	74.4	79.2
100	13.0	15.6	18.2	143	27.9	32.9	37.8	186	45.5	49.6	53.7	229	60.4	64.1	67.9	272	69.8	74.7	79.6
101	13.2	15.9	18.5	144	28.2	33.1	38.1	187	45.6	49.7	53.8	230	61.0	64.6	68.1	273	70.1	75.0	79.9
102	13.4	16.1	18.8	145	28.5	33.4	38.4	188	45.7	49.9	54.0	231	61.7	65.0	68.3	274	70.4	75.1	79.8
103	13.7	16.4	19.2	146	28.8	33.7	38.6	189	45.9	50.0	54.1	232	61.9	65.1	68.4	275	70.8	75.3	79.8
104	13.9	16.7	19.5	147	29.1	34.0	38.9	190	46.6	50.6	54.6	233	62.0	65.3	68.6	276	71.2	75.4	79.7
105	14.1	17.0	19.9	148	29.6	34.4	39.2	191	47.3	51.1	55.0	234	62.1	65.4	68.7	277	71.6	75.6	79.6
106	14.8	17.7	20.7	149	30.2	34.9	39.6	192	48.0	51.7	55.5	235	62.3	65.6	68.9	278	72.0	75.7	79.5
107	15.4	18.4	21.4	150	30.7	35.3	39.9	193	48.6	52.3	55.9	236	62.4	65.7	69.0	279	72.3	75.9	79.4
108	16.1	19.1	22.2	151	31.2	35.7	40.2	194	49.3	52.9	56.4	237	62.6	65.9	69.1	280	72.7	76.0	79.3
109	16.7	19.9	23.0	152	31.8	36.1	40.5	195	50.0	53.4	56.8	238	62.7	66.0	69.3	281	72.7	76.1	79.6
110	17.4	20.6	23.7	153	32.3	36.6	40.8	196	50.7	54.0	57.3	239	62.6	66.1	69.7	282	72.8	76.3	79.8
111	18.1	21.3	24.5	154	32.9	37.0	41.1	197	50.7	54.1	57.6	240	62.5	66.3	70.0	283	72.8	76.4	80.1
112	18.7	22.0	25.3	155	33.7	37.9	42.0	198	50.6	54.3	57.9	241	62.4	66.4	70.4	284	72.8	76.6	80.3
113	19.1	22.4	25.7	156	34.6	38.7	42.8	199	50.6	54.4	58.2	242	62.3	66.6	70.8	285	72.8	76.7	80.6
114	19.6	22.9	26.1	157	35.5	39.6	43.7	200	50.6	54.6	58.6	243	62.2	66.7	71.2	286	72.9	76.9	80.9
115	20.0	23.3	26.6	158	36.3	40.4	44.5	201	50.5	54.7	58.9	244	62.2	66.9	71.6	287	72.9	77.0	81.1
116	20.4	23.7	27.0	159	37.2	41.3	45.4	202	50.5	54.9	59.2	245	62.1	67.0	71.9				
117	20.9	24.1	27.4	160	38.0	42.1	46.3	203	50.5	55.0	59.5	246	62.4	67.3	72.2				
118	21.3	24.6	27.9	161	38.9	43.0	47.1	204	50.8	55.4	60.0	247	62.6	67.6	72.5				
119	21.7	25.0	28.3	162	39.3	43.3	47.3	205	51.2	55.9	60.5	248	62.9	67.9	72.8				

Humerus Length, Jeanty

Jeanty P, Dramaix-Wilmet M, van Kerkem J, Petroons P, Schwers J. "Ultrasonic Evaluation of Fetal Limb Growth, Part II" *Radiology* 143:751, 1982.

HL(mm)= -33.895341 +4.1233654 * MA(wks) - 0.042461521 * $MA(wk)^2$

5 & 95%: (1SD/2 * 1.645)

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
13	0	4.9	12.5	20.2	18	3	22.6	27.7	32.8	23	6	34.2	40.3	46.5	29	2	44.4	50.4	56.5	34	5	52.2	58.1	63.9
13	1	5.3	13.0	20.6	18	4	22.9	28.0	33.1	24	0	34.5	40.6	46.7	29	3	44.6	50.7	56.8	34	6	52.4	58.2	64.1
13	2	5.8	13.4	21.0	18	5	23.3	28.4	33.5	24	1	34.8	40.9	47.0	29	4	44.8	50.9	57.0	35	0	52.2	58.4	64.6
13	3	6.2	13.8	21.4	18	6	23.7	28.8	33.9	24	2	35.1	41.2	47.3	29	5	45.1	51.1	57.2	35	1	52.4	58.6	64.7
13	4	6.6	14.2	21.9	19	0	21.7	29.1	36.5	24	3	35.4	41.5	47.6	29	6	45.3	51.4	57.4	35	2	52.6	58.7	64.9
13	5	7.0	14.7	22.3	19	1	22.1	29.5	36.9	24	4	35.6	41.8	47.9	30	0	45.5	51.6	57.7	35	3	52.7	58.9	65.1
13	6	7.5	15.1	22.7	19	2	22.4	29.8	37.2	24	5	35.9	42.1	48.2	30	1	45.7	51.8	57.9	35	4	52.9	59.1	65.2
14	0	7.9	15.5	23.1	19	3	22.8	30.2	37.6	24	6	36.2	42.4	48.5	30	2	46.0	52.0	58.1	35	5	53.0	59.2	65.4
14	1	8.3	15.9	23.5	19	4	23.1	30.5	37.9	25	0	34.7	42.7	50.6	30	3	46.2	52.3	58.3	35	6	53.2	59.4	65.5
14	2	8.7	16.3	24.0	19	5	23.5	30.9	38.3	25	1	35.0	42.9	50.9	30	4	46.4	52.5	58.6	36	0	53.4	59.5	65.7
14	3	9.1	16.8	24.4	19	6	23.8	31.2	38.6	25	2	35.3	43.2	51.2	30	5	46.6	52.7	58.8	36	1	53.5	59.7	65.8
14	4	9.6	17.2	24.8	20	0	24.2	31.6	39.0	25	3	35.5	43.5	51.5	30	6	46.8	52.9	59.0	36	2	53.7	59.8	66.0
14	5	10.0	17.6	25.2	20	1	24.5	31.9	39.3	25	4	35.8	43.8	51.7	31	0	46.9	53.1	59.3	36	3	53.8	60.0	66.1
14	6	10.4	18.0	25.6	20	2	24.9	32.3	39.7	25	5	36.1	44.1	52.0	31	1	47.1	53.3	59.5	36	4	53.9	60.1	66.3
15	0	11.0	18.4	25.8	20	3	25.2	32.6	40.0	25	6	36.4	44.3	52.3	31	2	47.3	53.5	59.7	36	5	54.1	60.3	66.4
15	1	11.4	18.8	26.2	20	4	25.6	33.0	40.4	26	0	36.7	44.6	52.6	31	3	47.6	53.8	60.0	36	6	54.2	60.4	66.6
15	2	11.8	19.2	26.6	20	5	25.9	33.3	40.7	26	1	36.9	44.9	52.8	31	4	47.8	54.0	60.2	37	0	56.6	60.5	64.5
15	3	12.2	19.6	27.0	20	6	26.2	33.6	41.0	26	2	37.2	45.2	53.1	31	5	48.0	54.2	60.4	37	1	56.7	60.7	64.6
15	4	12.6	20.0	27.4	21	0	28.1	34.0	39.9	26	3	37.5	45.4	53.4	31	6	48.2	54.4	60.6	37	2	56.9	60.8	64.8
15	5	13.0	20.4	27.8	21	1	28.4	34.3	40.2	26	4	37.7	45.7	53.6	32	0	48.4	54.6	60.8	37	3	57.0	61.0	64.9
15	6	13.4	20.8	28.2	21	2	28.7	34.6	40.5	26	5	38.0	46.0	53.9	32	1	48.6	54.8	61.0	37	4	57.1	61.1	65.0
16	0	13.8	21.2	28.6	21	3	29.0	35.0	40.9	26	6	38.3	46.2	54.2	32	2	48.8	55.0	61.2	37	5	57.3	61.2	65.2
16	1	14.2	21.6	29.0	21	4	29.4	35.3	41.2	27	0	41.4	46.5	51.6	32	3	49.0	55.2	61.4	37	6	57.4	61.3	65.3
16	2	14.6	22.0	29.4	21	5	29.7	35.6	41.5	27	1	41.6	46.7	51.8	32	4	49.2	55.4	61.6	38	0	57.5	61.5	65.4
16	3	15.0	22.4	29.8	21	6	30.0	35.9	41.9	27	2	41.9	47.0	52.1	32	5	49.4	55.6	61.8	38	1	57.7	61.6	65.5
16	4	15.4	22.8	30.2	22	0	30.4	36.3	42.2	27	3	42.2	47.3	52.4	32	6	49.5	55.7	61.9	38	2	57.8	61.7	65.7
16	5	15.8	23.2	30.6	22	1	30.7	36.6	42.5	27	4	42.4	47.5	52.6	33	0	50.1	55.9	61.8	38	3	57.9	61.9	65.8
16	6	16.1	23.5	31.0	22	2	31.0	36.9	42.8	27	5	42.7	47.8	52.9	33	1	50.3	56.1	62.0	38	4	58.0	62.0	65.9
17	0	18.8	23.9	29.0	22	3	31.3	37.2	43.1	27	6	42.9	48.0	53.1	33	2	50.5	56.3	62.2	38	5	58.2	62.1	66.0
17	1	19.2	24.3	29.4	22	4	31.6	37.5	43.5	28	0	43.2	48.3	53.4	33	3	50.6	56.5	62.3	38	6	58.3	62.2	66.2
17	2	19.6	24.7	29.8	22	5	31.9	37.9	43.8	28	1	43.4	48.5	53.6	33	4	50.8	56.7	62.5	39	0	55.7	62.3	68.9
17	3	20.0	25.1	30.2	22	6	32.3	38.2	44.1	28	2	43.7	48.8	53.9	33	5	51.0	56.9	62.7	39	1	55.8	62.4	69.1
17	4	20.3	25.4	30.5	23	0	33.3	38.5	44.6	28	3	43.9	49.0	54.1	33	6	51.2	57.0	62.9	39	2	55.9	62.6	69.2
17	5	20.7	25.8	30.9	23	1	32.6	38.8	44.9	28	4	44.2	49.3	54.4	34	0	51.4	57.2	63.1	39	3	56.1	62.7	69.3
17	6	21.1	26.2	31.3	23	2	33.0	39.1	45.2	28	5	44.4	49.5	54.6	34	1	51.5	57.4	63.2	39	4	56.2	62.8	69.4
18	0	21.5	26.6	31.7	23	3	33.3	39.4	45.5	28	6	44.6	49.7	54.8	34	2	51.7	57.6	63.4	39	5	56.3	62.9	69.5
18	1	21.8	26.9	32.0	23	4	33.6	39.7	45.8	29	0	43.9	50.0	56.1	34	3	51.9	57.7	63.6	39	6	56.4	63.0	69.6
18	2	22.2	27.3	32.4	23	5	33.9	40.0	46.1	29	1	44.1	50.2	56.3	34	4	52.1	57.9	63.8	40	0	56.5	63.1	69.7

Humerus Length, Merz

Merz E, Kim-Kern M-S, Pehl S. "Ultrasonic Mensuration of Fetal Limb Bones in the Second and Third Trimesters." *Journal of Clinical Ultrasound* 15:175, March/April 1987.

5 & 95%: (2SD/2 * 1.645)

Wk	Day	5%	Mean	95%
13	0	8.4	10.0	11.6
13	1	8.7	10.3	11.9
13	2	9.0	10.6	12.2
13	3	9.3	10.9	12.5
13	4	9.5	11.1	12.7
13	5	9.8	11.4	13.0
13	6	10.1	11.7	13.3
14	0	10.4	12.0	13.6
14	1	10.7	12.3	13.9
14	2	11.0	12.6	14.2
14	3	11.3	12.9	14.5
14	4	11.5	13.1	14.7
14	5	11.8	13.4	15.0
14	6	12.1	13.7	15.3
15	0	12.4	14.0	15.6
15	1	12.8	14.4	16.0
15	2	13.3	14.9	16.5
15	3	13.7	15.3	16.9
15	4	14.1	15.7	17.3
15	5	14.5	16.1	17.7
15	6	15.0	16.6	18.2
16	0	15.4	17.0	18.6
16	1	15.6	17.4	19.3
16	2	15.8	17.9	19.9
16	3	16.0	18.3	20.6
16	4	16.1	18.7	21.3
16	5	16.3	19.1	22.0
16	6	16.5	19.6	22.6
17	0	16.7	20.0	23.3
17	1	17.2	20.4	23.6
17	2	17.8	20.9	23.9
17	3	18.3	21.3	24.2
17	4	18.9	21.7	24.6
17	5	19.4	22.1	24.9
17	6	20.0	22.6	25.2
18	0	20.5	23.0	25.5
18	1	20.9	23.4	25.9
18	2	21.4	23.9	26.4
18	3	21.8	24.3	26.8
18	4	22.2	24.7	27.2
18	5	22.6	25.1	27.6
18	6	23.1	25.6	28.1
19	0	23.5	26.0	28.5
19	1	23.9	26.4	28.9
19	2	24.4	26.9	29.4
19	3	24.8	27.3	29.8
19	4	25.2	27.7	30.2
19	5	25.6	28.1	30.6
19	6	26.1	28.6	31.1
20	0	26.5	29.0	31.5
20	1	26.8	29.4	32.0
20	2	27.1	29.9	32.6
20	3	27.4	30.3	33.1
20	4	27.8	30.7	33.7
20	5	28.1	31.1	34.2
20	6	28.4	31.6	34.8
21	0	28.7	32.0	35.3
21	1	29.0	32.1	35.3
21	2	29.2	32.3	35.4
21	3	29.5	32.4	35.4
21	4	29.7	32.6	35.4
21	5	30.0	32.7	35.4
21	6	30.2	32.9	35.5
22	0	30.5	33.0	35.5
22	1	31.1	33.6	36.1
22	2	31.6	34.1	36.6
22	3	32.2	34.7	37.2
22	4	32.8	35.3	37.8
22	5	33.4	35.9	38.4
22	6	33.9	36.4	38.9
23	0	34.5	37.0	39.5
23	1	34.5	37.1	39.8
23	2	34.6	37.3	40.0
23	3	34.6	37.4	40.3
23	4	34.6	37.6	40.5
23	5	34.6	37.7	40.8
23	6	34.7	37.9	41.0
24	0	34.7	38.0	41.3
24	1	35.3	38.6	41.9
24	2	35.8	39.1	42.4
24	3	36.4	39.7	43.0
24	4	37.0	40.3	43.6
24	5	37.6	40.9	44.2
24	6	38.1	41.4	44.7
25	0	38.7	42.0	45.3
25	1	39.0	42.1	45.3
25	2	39.2	42.3	45.4
25	3	39.5	42.4	45.4
25	4	39.7	42.6	45.4
25	5	40.0	42.7	45.4
25	6	40.2	42.9	45.5
26	0	40.5	43.0	45.5
26	1	40.9	43.3	45.7
26	2	41.3	43.6	45.8
26	3	41.7	43.9	46.0
26	4	42.2	44.1	46.1
26	5	42.6	44.4	46.3
26	6	43.0	44.7	46.4
27	0	43.4	45.0	46.6
27	1	43.4	45.3	47.1
27	2	43.5	45.6	47.7
27	3	43.5	45.9	48.2
27	4	43.6	46.1	48.7
27	5	43.6	46.4	49.2
27	6	43.7	46.7	49.8
28	0	43.7	47.0	50.3
28	1	43.8	47.1	50.4
28	2	44.0	47.3	50.6
28	3	44.1	47.4	50.7
28	4	44.3	47.6	50.9
28	5	44.4	47.7	51.0
28	6	44.6	47.9	51.2
29	0	44.7	48.0	51.3
29	1	44.9	48.3	51.7
29	2	45.0	48.6	52.1
29	3	45.2	48.9	52.5
29	4	45.4	49.1	52.9
29	5	45.6	49.4	53.3
29	6	45.7	49.7	53.7
30	0	45.9	50.0	54.1
30	1	46.4	50.4	54.4
30	2	47.0	50.9	54.7
30	3	47.5	51.3	55.0
30	4	48.1	51.7	55.4
30	5	48.6	52.1	55.7
30	6	49.2	52.6	56.0
31	0	49.7	53.0	56.3
31	1	49.8	53.1	56.4
31	2	50.0	53.3	56.6
31	3	50.1	53.4	56.7
31	4	50.3	53.6	56.9
31	5	50.4	53.7	57.0
31	6	50.6	53.9	57.2
32	0	50.7	54.0	57.3
32	1	50.9	54.3	57.7
32	2	51.0	54.6	58.1
32	3	51.2	54.9	58.5
32	4	51.4	55.1	58.9
32	5	51.6	55.4	59.3
32	6	51.7	55.7	59.7
33	0	51.9	56.0	60.1
33	1	52.2	56.3	60.4
33	2	52.5	56.6	60.7
33	3	52.8	56.9	61.0
33	4	53.0	57.1	61.2
33	5	53.3	57.4	61.5
33	6	53.6	57.7	61.8
34	0	53.9	58.0	62.1
34	1	53.9	58.1	62.4
34	2	54.0	58.3	62.6
34	3	54.0	58.4	62.9
34	4	54.0	58.6	63.1
34	5	54.0	58.7	63.4
34	6	54.1	58.9	63.6
35	0	54.1	59.0	63.9
35	1	54.2	59.1	64.0
35	2	54.4	59.3	64.2
35	3	54.5	59.4	64.3
35	4	54.7	59.6	64.5
35	5	54.8	59.7	64.6
35	6	55.0	59.9	64.8
36	0	55.1	60.0	64.9
36	1	55.5	60.1	64.8
36	2	55.8	60.3	64.7
36	3	56.2	60.4	64.6
36	4	56.6	60.6	64.6
36	5	57.0	60.7	64.5
36	6	57.3	60.9	64.4
37	0	57.7	61.0	64.3
37	1	58.2	61.4	64.6
37	2	58.8	61.9	64.9
37	3	59.3	62.3	65.2
37	4	59.9	62.7	65.6
37	5	60.4	63.1	65.9
37	6	61.0	63.6	66.2
38	0	61.5	64.0	66.5
38	1	61.3	64.1	67.0
38	2	61.1	64.3	67.5
38	3	60.9	64.4	68.0
38	4	60.7	64.6	68.4
38	5	60.5	64.7	68.9
38	6	60.3	64.9	69.4
39	0	60.1	65.0	69.9
39	1	60.5	65.1	69.8
39	2	60.8	65.3	69.7
39	3	61.2	65.4	69.6
39	4	61.6	65.6	69.6
39	5	62.0	65.7	69.5
39	6	62.3	65.9	69.4
40	0	62.7	66.0	69.3
40	1	62.7	66.0	69.3
40	2	62.7	66.0	69.3
40	3	62.7	66.0	69.3
40	4	62.7	66.0	69.3
40	5	62.7	66.0	69.3
40	6	62.7	66.0	69.3
41	0	62.7	66.0	69.3
41	1	62.6	66.3	69.9
41	2	62.6	66.6	70.6
41	3	62.5	66.9	71.2
41	4	62.4	67.1	71.9
41	5	62.3	67.4	72.5
41	6	62.3	67.7	73.2
42	0	62.2	68.0	73.8

Humerus Length, Hansmann

Hansmann M, Hackelöer B-J, Staudach A. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, 1985.

Wk	Day	5%	Mean	95%
12	0	0	9.0	0
12	1	0	9.3	0
12	2	0	9.6	0
12	3	0	9.9	0
12	4	0	10.1	0
12	5	0	10.4	0
12	6	0	10.7	0
13	0	6.0	11.0	16.0
13	1	6.4	11.4	16.4
13	2	6.9	11.9	16.9
13	3	7.3	12.3	17.3
13	4	7.7	12.7	17.7
13	5	8.1	13.1	18.1
13	6	8.6	13.6	18.6
14	0	9.0	14.0	19.0
14	1	9.4	14.4	19.4
14	2	9.9	14.9	19.9
14	3	10.3	15.3	20.3
14	4	10.7	15.7	20.7
14	5	11.1	16.1	21.1
14	6	11.6	16.6	21.6
15	0	12.0	17.0	22.0
15	1	12.4	17.4	22.4
15	2	12.9	17.9	22.9
15	3	13.3	18.3	23.3
15	4	13.7	18.7	23.7
15	5	14.1	19.1	24.1
15	6	14.6	19.6	24.6
16	0	15.0	20.0	25.0
16	1	15.4	20.3	25.3
16	2	15.9	20.6	25.6
16	3	16.3	20.9	25.9
16	4	16.7	21.1	26.1
16	5	17.1	21.4	26.4
16	6	17.6	21.7	26.7
17	0	18.0	22.0	27.0
17	1	18.3	22.4	27.4
17	2	18.6	22.9	27.9
17	3	18.9	23.3	28.3
17	4	19.1	23.7	28.7
17	5	19.4	24.1	29.1
17	6	19.7	24.6	29.6
18	0	20.0	25.0	30.0
18	1	20.4	25.4	30.4
18	2	20.9	25.9	30.9
18	3	21.3	26.3	31.3
18	4	21.7	26.7	31.7
18	5	22.1	27.1	32.1
18	6	22.6	27.6	32.6
19	0	23.0	28.0	33.0
19	1	23.3	28.3	33.3
19	2	23.6	28.6	33.6
19	3	23.9	28.9	33.9
19	4	24.1	29.1	34.1
19	5	24.4	29.4	34.4
19	6	24.7	29.7	34.7
20	0	25.0	30.0	35.0
20	1	25.4	30.4	35.4
20	2	25.9	30.9	35.9
20	3	26.3	31.3	36.3
20	4	26.7	31.7	36.7
20	5	27.1	32.1	37.1
20	6	27.6	32.6	37.6
21	0	28.0	33.0	38.0
21	1	28.3	33.3	38.3
21	2	28.6	33.6	38.6
21	3	28.9	33.9	38.9
21	4	29.1	34.1	39.1
21	5	29.4	34.4	39.4
21	6	29.7	34.7	39.7
22	0	30.0	35.0	40.0
22	1	30.4	35.4	40.3
22	2	30.9	35.9	40.6
22	3	31.3	36.3	40.9
22	4	31.7	36.7	41.1
22	5	32.1	37.1	41.4
22	6	32.6	37.6	41.7
23	0	33.0	38.0	42.0
23	1	33.3	38.3	42.4
23	2	33.6	38.6	42.9
23	3	33.9	38.9	43.3
23	4	34.1	39.1	43.7
23	5	34.4	39.4	44.1
23	6	34.7	39.7	44.6
24	0	35.0	40.0	45.0
24	1	35.3	40.3	45.3
24	2	35.6	40.6	45.6
24	3	35.9	40.9	45.9
24	4	36.1	41.1	46.1
24	5	36.4	41.4	46.4
24	6	36.7	41.7	46.7
25	0	37.0	42.0	47.0
25	1	37.3	42.3	47.3
25	2	37.6	42.6	47.6
25	3	37.9	42.9	47.9
25	4	38.1	43.1	48.1
25	5	38.4	43.4	48.4
25	6	38.7	43.7	48.7
26	0	39.0	44.0	49.0
26	1	39.3	44.3	49.3
26	2	39.6	44.6	49.6
26	3	39.9	44.9	49.9
26	4	40.1	45.1	50.1
26	5	40.4	45.4	50.4
26	6	40.7	45.7	50.7
27	0	41.0	46.0	51.0
27	1	41.3	46.3	51.3
27	2	41.6	46.6	51.6
27	3	41.9	46.9	51.9
27	4	42.1	47.1	52.1
27	5	42.4	47.4	52.4
27	6	42.7	47.7	52.7
28	0	43.0	48.0	53.0
28	1	43.3	48.3	53.3
28	2	43.6	48.6	53.6
28	3	43.9	48.9	53.9
28	4	44.1	49.1	54.1
28	5	44.4	49.4	54.4
28	6	44.7	49.7	54.7
29	0	45.0	50.0	55.0
29	1	45.3	50.1	55.1
29	2	45.6	50.3	55.3
29	3	45.9	50.4	55.4
29	4	46.1	50.6	55.6
29	5	46.4	50.7	55.7
29	6	46.7	50.9	55.9
30	0	47.0	51.0	56.0
30	1	47.1	51.3	56.3
30	2	47.3	51.6	56.6
30	3	47.4	51.9	56.9
30	4	47.6	52.1	57.1
30	5	47.7	52.4	57.4
30	6	47.9	52.7	57.7
31	0	48.0	53.0	58.0
31	1	48.3	53.3	58.3
31	2	48.6	53.6	58.6
31	3	48.9	53.9	58.9
31	4	49.1	54.1	59.1
31	5	49.4	54.4	59.4
31	6	49.7	54.7	59.7
32	0	50.0	55.0	60.0
32	1	50.1	55.1	60.1
32	2	50.3	55.3	60.3
32	3	50.4	55.4	60.4
32	4	50.6	55.6	60.6
32	5	50.7	55.7	60.7
32	6	50.9	55.9	60.9
33	0	51.0	56.0	61.0
33	1	51.3	56.3	61.3
33	2	51.6	56.6	61.6
33	3	51.9	56.9	61.9
33	4	52.1	57.1	62.1
33	5	52.4	57.4	62.4
33	6	52.7	57.7	62.7
34	0	53.0	58.0	63.0
34	1	53.1	58.1	63.1
34	2	53.3	58.3	63.3
34	3	53.4	58.4	63.4
34	4	53.6	58.6	63.6
34	5	53.7	58.7	63.7
34	6	53.9	58.9	63.9
35	0	54.0	59.0	64.0
35	1	54.3	59.3	64.1
35	2	54.6	59.6	64.3
35	3	54.9	59.9	64.4
35	4	55.1	60.1	64.6
35	5	55.4	60.4	64.7
35	6	55.7	60.7	64.9
36	0	56.0	61.0	65.0
36	1	56.1	61.1	65.3
36	2	56.3	61.3	65.6
36	3	56.4	61.4	65.9
36	4	56.6	61.6	66.1
36	5	56.7	61.7	66.4
36	6	56.9	61.9	66.7
37	0	57.0	62.0	67.0
37	1	57.3	62.1	67.1
37	2	57.6	62.3	67.3
37	3	57.9	62.4	67.4
37	4	58.1	62.6	67.6
37	5	58.4	62.7	67.7
37	6	58.7	62.9	67.9
38	0	59.0	63.0	68.0
38	1	59.1	63.3	68.3
38	2	59.3	63.6	68.6
38	3	59.4	63.9	68.9
38	4	59.6	64.1	69.1
38	5	59.7	64.4	69.4
38	6	59.9	64.7	69.7
39	0	60.0	65.0	70.0
39	1	60.1	65.1	70.1
39	2	60.3	65.3	70.3
39	3	60.4	65.4	70.4
39	4	60.6	65.6	70.6
39	5	60.7	65.7	70.7
39	6	60.9	65.9	70.9
40	0	61.0	66.0	71.0

Humerus Length, Osaka

Aoki M, Yamada M. "Examining Fetal Growth." *Obstetrics and Gynecology* 47:547-556, 1983.

HL Days	- 1.5SD	mean mm	+ 1.5SD	HL Days	- 1.5SD	mean mm	+ 1.5SD	HL Days	- 1.5SD	mean mm	+ 1.5SD	HL Days	- 1.5SD	mean mm	+ 1.5SD	HL Days	- 1.5SD	mean mm	+ 1.5SD
91	7.1	10.1	13.1	129	21.9	25.2	28.5	167	34.3	37.9	41.5	205	44.4	48.3	52.2	243	52.2	56.2	60.3
92	7.5	10.5	13.5	130	22.3	25.6	28.9	168	34.6	38.2	41.8	206	44.6	48.5	52.4	244	52.4	56.4	60.5
93	7.9	10.9	13.9	131	22.6	25.9	29.2	169	34.9	38.5	42.1	207	44.8	48.7	52.6	245	52.3	56.5	60.7
94	8.4	11.4	14.4	132	23.0	26.3	29.6	170	35.2	38.8	42.4	208	45.1	49.0	52.9	246	52.5	56.7	60.9
95	8.8	11.8	14.8	133	23.4	26.7	30.0	171	35.5	39.1	42.7	209	45.3	49.2	53.1	247	52.7	56.9	61.1
96	9.2	12.2	15.2	134	23.7	27.0	30.3	172	35.8	39.4	43.0	210	45.5	49.4	53.3	248	52.9	57.1	61.3
97	9.5	12.6	15.8	135	24.1	27.4	30.7	173	36.1	39.7	43.3	211	45.8	49.7	53.6	249	53.0	57.2	61.4
98	10.0	13.1	16.3	136	24.4	27.7	31.0	174	36.4	40.0	43.6	212	46.0	49.9	53.8	250	53.2	57.4	61.6
99	10.4	13.5	16.7	137	24.8	28.1	31.4	175	36.7	40.3	43.9	213	46.2	50.1	54.0	251	53.4	57.6	61.8
100	10.8	13.9	17.1	138	25.1	28.4	31.7	176	37.0	40.6	44.2	214	46.5	50.4	54.3	252	53.5	57.7	61.9
101	11.2	14.3	17.5	139	25.4	28.8	32.3	177	37.3	40.9	44.5	215	46.7	50.6	54.5	253	53.7	57.9	62.1
102	11.6	14.7	17.9	140	25.7	29.1	32.6	178	37.6	41.2	44.8	216	46.9	50.8	54.7	254	53.8	58.0	62.2
103	12.0	15.1	18.3	141	26.1	29.5	33.0	179	37.8	41.4	45.0	217	47.1	51.0	54.9	255	54.0	58.2	62.4
104	12.4	15.5	18.7	142	26.4	29.8	33.3	180	38.1	41.7	45.3	218	47.3	51.2	55.1	256	54.2	58.4	62.6
105	12.8	15.9	19.1	143	26.8	30.2	33.7	181	38.4	42.0	45.6	219	47.6	51.5	55.4	257	54.3	58.5	62.7
106	13.2	16.3	19.5	144	27.1	30.5	34.0	182	38.6	42.3	46.1	220	47.8	51.7	55.6	258	54.5	58.7	62.9
107	13.6	16.7	19.9	145	27.5	30.9	34.4	183	38.9	42.6	46.4	221	48.0	51.9	55.8	259	54.6	58.8	63.0
108	14.0	17.1	20.3	146	27.8	31.2	34.7	184	39.1	42.8	46.6	222	48.2	52.1	56.0	260	54.8	59.0	63.2
109	14.4	17.5	20.7	147	28.1	31.5	35.0	185	39.4	43.1	46.9	223	48.4	52.3	56.2	261	54.9	59.1	63.3
110	14.8	17.9	21.1	148	28.5	31.9	35.4	186	39.7	43.4	47.2	224	48.5	52.5	56.6	262	55.1	59.3	63.5
111	15.2	18.3	21.5	149	28.8	32.2	35.7	187	40.0	43.7	47.5	225	48.7	52.7	56.8	263	55.2	59.4	63.6
112	15.6	18.7	21.9	150	29.1	32.5	36.0	188	40.2	43.9	47.7	226	48.9	52.9	57.0	264	55.3	59.5	63.7
113	16.0	19.1	22.3	151	29.5	32.9	36.4	189	40.5	44.2	48.0	227	49.1	53.1	57.2	265	55.5	59.7	63.9
114	16.4	19.5	22.7	152	29.8	33.2	36.7	190	40.8	44.5	48.3	228	49.3	53.3	57.4	266	55.5	59.8	64.2
115	16.8	19.9	23.1	153	30.1	33.5	37.0	191	41.0	44.7	48.5	229	49.5	53.5	57.6	267	55.7	60.0	64.4
116	17.2	20.3	23.5	154	30.4	33.8	37.3	192	41.3	45.0	48.8	230	49.7	53.7	57.8	268	55.8	60.1	64.5
117	17.6	20.7	23.9	155	30.8	34.2	37.7	193	41.6	45.3	49.1	231	49.9	53.9	58.0	269	55.9	60.2	64.6
118	17.8	21.1	24.4	156	31.1	34.5	38.0	194	41.8	45.5	49.3	232	50.1	54.1	58.2	270	56.1	60.4	64.8
119	18.2	21.5	24.8	157	31.4	34.8	38.3	195	42.1	45.8	49.6	233	50.3	54.3	58.4	271	56.2	60.5	64.9
120	18.5	21.8	25.1	158	31.7	35.1	38.6	196	42.3	46.0	49.8	234	50.5	54.5	58.6	272	56.3	60.6	65.0
121	18.9	22.2	25.5	159	32.0	35.4	38.9	197	42.6	46.3	50.1	235	50.7	54.7	58.8	273	56.5	60.8	65.2
122	19.3	22.6	25.9	160	32.2	35.8	39.4	198	42.8	46.5	50.3	236	50.9	54.9	59.0	274	56.6	60.9	65.3
123	19.7	23.0	26.3	161	32.5	36.1	39.7	199	43.1	46.8	50.6	237	51.1	55.1	59.2	275	56.7	61.0	65.4
124	20.1	23.4	26.7	162	32.8	36.4	40.0	200	43.3	47.0	50.8	238	51.3	55.3	59.4	276	56.8	61.1	65.5
125	20.4	23.7	27.0	163	33.1	36.7	40.3	201	43.6	47.3	51.1	239	51.5	55.5	59.6	277	57.0	61.3	65.7
126	20.8	24.1	27.4	164	33.4	37.0	40.6	202	43.8	47.5	51.3	240	51.7	55.7	59.8	278	57.1	61.4	65.8
127	21.2	24.5	27.8	165	33.7	37.3	40.9	203	43.9	47.8	51.7	241	51.8	55.8	59.9	279	57.2	61.5	65.9
128	21.5	24.8	28.1	166	34.0	37.6	41.2	204	44.1	48.0	51.9	242	52.0	56.0	60.1	280	57.3	61.6	66.0

Humerus Length, ASUM

Westerway SC. "Ultrasonic Fetal Measurements: New Australian Standards for the New Millennium." *Aust NZ J Obstet Gynaecol* 40:3:297-302, 2000.

HL Days	5%	mean mm	95%	HL Days	5%	mean mm	95%	HL Days	5%	mean mm	95%	HL Days	5%	mean mm	95%	HL Days	5%	mean mm	95%
77	5.5	8.0	10.5	120	21.1	25.3	29.5	163	34.8	38.6	42.3	206	47.3	51.4	55.5	249	56.7	61.1	65.6
78	5.8	8.1	10.5	121	21.3	25.6	29.8	164	34.9	38.9	42.9	207	47.5	51.6	55.7	250	57.1	61.4	65.8
79	6.1	8.3	10.5	122	21.6	25.9	30.1	165	34.9	39.1	43.4	208	47.6	51.7	55.8	251	57.5	61.7	65.9
80	6.3	8.4	10.5	123	21.8	26.1	30.5	166	35.0	39.4	43.9	209	47.7	51.9	56.0	252	57.9	62.0	66.1
81	6.6	8.6	10.6	124	22.0	26.4	30.8	167	35.0	39.7	44.4	210	47.9	52.0	56.1	253	57.9	62.1	66.4
82	6.8	8.7	10.6	125	22.2	26.7	31.2	168	35.1	40.0	44.9	211	48.2	52.3	56.4	254	57.9	62.3	66.6
83	7.1	8.9	10.6	126	22.5	27.0	31.5	169	35.6	40.4	45.2	212	48.5	52.6	56.7	255	58.0	62.4	66.9
84	7.4	9.0	10.6	127	22.8	27.3	31.8	170	36.2	40.9	45.6	213	48.7	52.9	57.0	256	58.0	62.6	67.2
85	7.5	9.3	11.0	128	23.2	27.6	32.0	171	36.7	41.3	45.9	214	49.0	53.1	57.3	257	58.0	62.7	67.4
86	7.7	9.6	11.5	129	23.5	27.9	32.2	172	37.2	41.7	46.2	215	49.3	53.4	57.5	258	58.0	62.9	67.7
87	7.9	9.9	11.9	130	23.9	28.1	32.4	173	37.8	42.1	46.5	216	49.6	53.7	57.8	259	58.1	63.0	67.9
88	8.0	10.1	12.3	131	24.2	28.4	32.7	174	38.3	42.6	46.8	217	49.9	54.0	58.1	260	58.2	63.1	68.1
89	8.2	10.4	12.7	132	24.5	28.7	32.9	175	38.9	43.0	47.1	218	50.2	54.3	58.4	261	58.4	63.3	68.2
90	8.4	10.7	13.1	133	24.9	29.0	33.1	176	39.1	43.1	47.1	219	50.5	54.6	58.7	262	58.5	63.4	68.4
91	8.5	11.0	13.5	134	25.2	29.3	33.4	177	39.4	43.3	47.2	220	50.7	54.9	59.0	263	58.6	63.6	68.5
92	8.8	11.4	14.0	135	25.5	29.6	33.7	178	39.7	43.4	47.2	221	51.0	55.1	59.3	264	58.8	63.7	68.6
93	9.2	11.9	14.6	136	25.7	29.9	34.0	179	39.9	43.6	47.2	222	51.3	55.4	59.5	265	58.9	63.9	68.8
94	9.5	12.3	15.1	137	26.0	30.1	34.3	180	40.2	43.7	47.2	223	51.6	55.7	59.8	266	59.1	64.0	68.9
95	9.8	12.7	15.7	138	26.3	30.4	34.5	181	40.4	43.9	47.3	224	51.9	56.0	60.1	267	59.3	64.1	69.0
96	10.1	13.1	16.2	139	26.6	30.7	34.8	182	40.7	44.0	47.3	225	51.9	56.1	60.4	268	59.5	64.3	69.1
97	10.4	13.6	16.7	140	26.9	31.0	35.1	183	41.1	44.4	47.7	226	51.9	56.3	60.6	269	59.7	64.4	69.2
98	10.7	14.0	17.3	141	26.9	31.1	35.4	184	41.6	44.9	48.1	227	52.0	56.4	60.9	270	59.9	64.6	69.3
99	11.0	14.4	17.9	142	26.9	31.3	35.6	185	42.0	45.3	48.6	228	52.0	56.6	61.2	271	60.1	64.7	69.4
100	11.2	14.9	18.5	143	27.0	31.4	35.9	186	42.4	45.7	49.0	229	52.0	56.7	61.4	272	60.3	64.9	69.4
101	11.5	15.3	19.1	144	27.0	31.6	36.2	187	42.9	46.1	49.4	230	52.0	56.9	61.7	273	60.5	65.0	69.5
102	11.7	15.7	19.7	145	27.0	31.7	36.4	188	43.3	46.6	49.9	231	52.1	57.0	61.9	274	60.6	65.1	69.7
103	12.0	16.1	20.3	146	27.0	31.9	36.7	189	43.7	47.0	50.3	232	52.4	57.3	62.2	275	60.6	65.3	69.9
104	12.2	16.6	20.9	147	27.1	32.0	36.9	190	44.0	47.4	50.8	233	52.8	57.6	62.4	276	60.7	65.4	70.1
105	12.5	17.0	21.5	148	27.5	32.4	37.4	191	44.3	47.9	51.4	234	53.1	57.9	62.6	277	60.8	65.6	70.3
106	13.2	17.6	21.9	149	27.9	32.9	37.8	192	44.6	48.3	51.9	235	53.4	58.1	62.8	278	60.9	65.7	70.5
107	14.0	18.1	22.3	150	28.4	33.3	38.2	193	45.0	48.7	52.5	236	53.8	58.4	63.1	279	61.0	65.9	70.7
108	14.7	18.7	22.7	151	28.8	33.7	38.6	194	45.3	49.1	53.0	237	54.1	58.7	63.3	280	61.1	66.0	70.9
109	15.5	19.3	23.1	152	29.2	34.1	39.1	195	45.6	49.6	53.6	238	54.5	59.0	63.5	281	61.4	66.3	71.2
110	16.2	19.9	23.5	153	29.6	34.6	39.5	196	45.9	50.0	54.1	239	54.6	59.1	63.7	282	61.6	66.6	71.5
111	17.0	20.4	23.9	154	30.1	35.0	39.9	197	46.0	50.1	54.3	240	54.6	59.3	63.9	283	61.9	66.9	71.8
112	17.7	21.0	24.3	155	30.7	35.4	40.1	198	46.2	50.3	54.4	241	54.7	59.4	64.1	284	62.2	67.1	72.1
113	18.2	21.6	25.0	156	31.4	35.9	40.3	199	46.3	50.4	54.5	242	54.8	59.6	64.3	285	62.5	67.4	72.4
114	18.6	22.1	25.7	157	32.1	36.3	40.5	200	46.5	50.6	54.7	243	54.9	59.7	64.5	286	62.8	67.7	72.6
115	19.1	22.7	26.4	158	32.7	36.7	40.7	201	46.6	50.7	54.8	244	55.0	59.9	64.7	287	63.1	68.0	72.9
116	19.5	23.3	27.0	159	33.4	37.1	40.9	202	46.7	50.9	55.0	245	55.1	60.0	64.9				
117	20.0	23.9	27.7	160	34.0	37.6	41.1	203	46.9	51.0	55.1	246	55.5	60.3	65.1				
118	20.4	24.4	28.4	161	34.7	38.0	41.3	204	47.0	51.1	55.3	247	55.9	60.6	65.3				
119	20.9	25.0	29.1	162	34.8	38.3	41.8	205	47.2	51.3	55.4	248	56.3	60.9	65.4				

Ulna Length, Jeanty

Jeanty P, Dramaix-Wilmet M, van Kerkem J, Petroons P, Schwers J. "Ultrasonic Evaluation of Fetal Limb Growth, Part II" *Radiology* 143:751, 1982.

Ulna(mm)=3.8984839 * MA(wk) - 0.040382251 * MA(wk)^2- 33.169956

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
11	0	3.2	4.8	6.5	16	6	15.1	21.1	27.1	22	5	29.1	34.5	40.0	28	4	39.9	45.3	50.6	34	3	44.8	53.2	61.6
11	1	3.6	5.3	6.9	17	0	11.1	21.4	31.7	22	6	29.4	34.8	40.3	28	5	40.2	45.5	50.8	34	4	44.9	53.3	61.8
11	2	4.0	5.7	7.3	17	1	11.5	21.8	32.1	23	0	27.6	35.1	42.7	28	6	40.4	45.7	51.0	34	5	45.1	53.5	61.9
11	3	4.5	6.1	7.8	17	2	11.9	22.2	32.4	23	1	27.8	35.4	43.0	29	0	40.3	45.9	51.5	34	6	45.2	53.7	62.1
11	4	4.9	6.5	8.2	17	3	12.2	22.5	32.8	23	2	28.1	35.7	43.3	29	1	40.6	46.1	51.7	35	0	46.6	53.8	61.0
11	5	5.3	7.0	8.6	17	4	12.6	22.9	33.1	23	3	28.4	36.0	43.6	29	2	40.8	46.4	52.0	35	1	46.8	54.0	61.2
11	6	5.7	7.4	9.0	17	5	12.9	23.2	33.5	23	4	28.7	36.3	43.9	29	3	41.0	46.6	52.2	35	2	46.9	54.1	61.3
12	0	6.2	7.8	9.4	17	6	13.3	23.6	33.9	23	5	29.0	36.6	44.2	29	4	41.2	46.8	52.4	35	3	47.1	54.3	61.5
12	1	6.6	8.2	9.9	18	0	13.6	23.9	34.2	23	6	29.3	36.9	44.4	29	5	41.4	47.0	52.6	35	4	47.2	54.4	61.6
12	2	7.0	8.6	10.3	18	1	14.0	24.3	34.6	24	0	29.6	37.1	44.7	29	6	41.6	47.2	52.8	35	5	47.3	54.6	61.8
12	3	7.4	9.0	10.7	18	2	14.3	24.6	34.9	24	1	29.8	37.4	45.0	30	0	41.9	47.4	53.0	35	6	47.5	54.7	61.9
12	4	7.8	9.5	11.1	18	3	14.7	25.0	35.2	24	2	30.1	37.7	45.3	30	1	42.1	47.7	53.2	36	0	47.6	54.8	62.1
12	5	8.2	9.9	11.5	18	4	15.0	25.3	35.6	24	3	30.4	38.0	45.5	30	2	42.3	47.9	53.4	36	1	47.8	55.0	62.2
12	6	8.6	10.3	11.9	18	5	15.4	25.6	35.9	24	4	30.7	38.2	45.8	30	3	42.5	48.1	53.7	36	2	47.9	55.1	62.3
13	0	3.4	10.7	17.9	18	6	15.7	26.0	36.3	24	5	30.9	38.5	46.1	30	4	42.7	48.3	53.9	36	3	48.0	55.3	62.5
13	1	3.8	11.1	18.3	19	0	20.1	26.3	32.5	24	6	31.2	38.8	46.4	30	5	42.9	48.5	54.1	36	4	48.2	55.4	62.6
13	2	4.2	11.5	18.7	19	1	20.5	26.7	32.8	25	0	34.4	39.1	43.7	30	6	43.1	48.7	54.3	36	5	48.3	55.5	62.7
13	3	4.6	11.9	19.2	19	2	20.8	27.0	33.2	25	1	34.7	39.3	43.9	31	0	39.0	48.9	58.7	36	6	48.4	55.7	62.9
13	4	5.0	12.3	19.6	19	3	21.1	27.3	33.5	25	2	35.0	39.6	44.2	31	1	39.2	49.1	58.9	37	0	49.3	55.8	62.2
13	5	5.4	12.7	20.0	19	4	21.5	27.7	33.8	25	3	35.2	39.9	44.5	31	2	39.4	49.3	59.1	37	1	49.5	55.9	62.4
13	6	5.8	13.1	20.3	19	5	21.8	28.0	34.2	25	4	35.5	40.1	44.7	31	3	39.6	49.5	59.3	37	2	49.6	56.0	62.5
14	0	6.2	13.5	20.7	19	6	22.1	28.3	34.5	25	5	35.8	40.4	45.0	31	4	39.8	49.7	59.5	37	3	49.7	56.2	62.6
14	1	6.6	13.9	21.1	20	0	22.5	28.6	34.8	25	6	36.0	40.6	45.2	31	5	40.0	49.9	59.7	37	4	49.9	56.3	62.7
14	2	7.0	14.3	21.5	20	1	22.8	29.0	35.2	26	0	36.3	40.9	45.5	31	6	40.2	50.0	59.9	37	5	50.0	56.4	62.9
14	3	7.4	14.7	21.9	20	2	23.1	29.3	35.5	26	1	36.5	41.1	45.8	32	0	40.4	50.2	60.1	37	6	50.1	56.5	63.0
14	4	7.8	15.1	22.3	20	3	23.4	29.6	35.8	26	2	36.8	41.4	46.0	32	1	40.6	50.4	60.3	38	0	50.2	56.7	63.1
14	5	8.2	15.5	22.7	20	4	23.8	29.9	36.1	26	3	37.0	41.7	46.3	32	2	40.7	50.6	60.5	38	1	50.3	56.8	63.2
14	6	8.6	15.8	23.1	20	5	24.1	30.3	36.4	26	4	37.3	41.9	46.5	32	3	40.9	50.8	60.6	38	2	50.4	56.9	63.3
15	0	10.2	16.2	22.2	20	6	24.4	30.6	36.8	26	5	37.5	42.2	46.8	32	4	41.1	51.0	60.8	38	3	50.6	57.0	63.5
15	1	10.6	16.6	22.6	21	0	25.4	30.9	36.4	26	6	37.8	42.4	47.0	32	5	41.3	51.1	61.0	38	4	50.7	57.1	63.6
15	2	11.0	17.0	23.0	21	1	25.7	31.2	36.7	27	0	37.3	42.7	48.0	32	6	41.5	51.3	61.2	38	5	50.8	57.2	63.7
15	3	11.4	17.4	23.3	21	2	26.1	31.5	37.0	27	1	37.6	42.9	48.2	33	0	43.1	51.5	59.9	38	6	50.9	57.3	63.8
15	4	11.8	17.7	23.7	21	3	26.4	31.8	37.3	27	2	37.8	43.1	48.5	33	1	43.3	51.7	60.1	39	0	48.6	57.4	66.3
15	5	12.1	18.1	24.1	21	4	26.7	32.1	37.6	27	3	38.1	43.4	48.7	33	2	43.4	51.9	60.3	39	1	48.7	57.6	66.4
15	6	12.5	18.5	24.5	21	5	27.0	32.4	37.9	27	4	38.3	43.6	48.9	33	3	43.6	52.0	60.4	39	2	48.9	57.7	66.5
16	0	12.9	18.9	24.8	21	6	27.3	32.7	38.2	27	5	38.5	43.9	49.2	33	4	43.8	52.2	60.6	39	3	49.0	57.8	66.6
16	1	13.3	19.2	25.2	22	0	27.6	33.1	38.5	27	6	38.8	44.1	49.4	33	5	43.9	52.4	60.8	39	4	49.1	57.9	66.7
16	2	13.6	19.6	25.6	22	1	27.9	33.4	38.8	28	0	39.0	44.3	49.6	33	6	44.1	52.5	61.0	39	5	49.2	58.0	66.8
16	3	14.0	20.0	26.0	22	2	28.2	33.7	39.1	28	1	39.2	44.6	49.9	34	0	44.3	52.7	61.1	39	6	49.3	58.1	66.9
16	4	14.4	20.3	26.3	22	3	28.5	34.0	39.4	28	2	39.5	44.8	50.1	34	1	44.4	52.9	61.3	40	0	49.4	58.2	67.0
16	5	14.7	20.7	26.7	22	4	28.8	34.3	39.7	28	3	39.7	45.0	50.3	34	2	44.6	53.0	61.4					

Ulna Length, Merz

Merz E, Kim-Kern M-S, Pehl S. "Ultrasonic Mensuration of Fetal Limb Bones in the Second and Third Trimesters." *Journal of Clinical Ultrasound* 15:175, March/April 1987.

5 & 95%: (2SD/2 * 1.645)

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
13	0	5.5	8.0	10.5	18	6	21.2	23.7	26.2	24	5	34.8	38.1	41.4	30	4	45.2	48.1	51.1	36	3	52.6	55.4	58.3
13	1	5.9	8.3	10.7	19	0	21.5	24.0	26.5	24	6	35.3	38.6	41.9	30	5	45.4	48.4	51.5	36	4	52.6	55.6	58.5
13	2	6.3	8.6	10.8	19	1	21.9	24.4	26.9	25	0	35.7	39.0	42.3	30	6	45.5	48.7	51.9	36	5	52.6	55.7	58.8
13	3	6.7	8.9	11.0	19	2	22.4	24.9	27.4	25	1	36.0	39.1	42.3	31	0	45.7	49.0	52.3	36	6	52.7	55.9	59.0
13	4	7.2	9.1	11.1	19	3	22.8	25.3	27.8	25	2	36.2	39.3	42.4	31	1	45.6	49.1	52.7	37	0	52.7	56.0	59.3
13	5	7.6	9.4	11.3	19	4	23.2	25.7	28.2	25	3	36.5	39.4	42.4	31	2	45.5	49.3	53.0	37	1	52.8	56.3	59.8
13	6	8.0	9.7	11.4	19	5	23.6	26.1	28.6	25	4	36.7	39.6	42.4	31	3	45.4	49.4	53.4	37	2	52.8	56.6	60.3
14	0	8.4	10.0	11.6	19	6	24.1	26.6	29.1	25	5	37.0	39.7	42.4	31	4	45.4	49.6	53.8	37	3	52.9	56.9	60.8
14	1	8.8	10.3	11.8	20	0	24.5	27.0	29.5	25	6	37.2	39.9	42.5	31	5	45.3	49.7	54.2	37	4	52.9	57.1	61.4
14	2	9.2	10.6	11.9	20	1	24.8	27.4	30.0	26	0	37.5	40.0	42.5	31	6	45.2	49.9	54.5	37	5	53.0	57.4	61.9
14	3	9.6	10.9	12.1	20	2	25.1	27.9	30.6	26	1	37.8	40.1	42.5	32	0	45.1	50.0	54.9	37	6	53.0	57.7	62.4
14	4	10.0	11.1	12.3	20	3	25.4	28.3	31.1	26	2	38.0	40.3	42.5	32	1	45.7	50.3	54.8	38	0	53.1	58.0	62.9
14	5	10.4	11.4	12.5	20	4	25.8	28.7	31.7	26	3	38.3	40.4	42.5	32	2	46.4	50.6	54.8	38	1	53.4	58.3	63.2
14	6	10.8	11.7	12.6	20	5	26.1	29.1	32.2	26	4	38.6	40.6	42.6	32	3	47.0	50.9	54.7	38	2	53.7	58.6	63.5
15	0	11.2	12.0	12.8	20	6	26.4	29.6	32.8	26	5	38.9	40.7	42.6	32	4	47.6	51.1	54.7	38	3	54.0	58.9	63.8
15	1	11.5	12.6	13.6	21	0	26.7	30.0	33.3	26	6	39.1	40.9	42.6	32	5	48.2	51.4	54.6	38	4	54.2	59.1	64.0
15	2	11.9	13.1	14.4	21	1	26.8	30.1	33.4	27	0	39.4	41.0	42.6	32	6	48.9	51.7	54.6	38	5	54.5	59.4	64.3
15	3	12.2	13.7	15.2	21	2	27.0	30.3	33.6	27	1	39.5	41.4	43.4	33	0	49.5	52.0	54.5	38	6	54.8	59.7	64.6
15	4	12.5	14.3	16.1	21	3	27.1	30.4	33.7	27	2	39.5	41.9	44.2	33	1	49.6	52.3	55.0	39	0	55.1	60.0	64.9
15	5	12.8	14.9	16.9	21	4	27.3	30.6	33.9	27	3	39.6	42.3	45.0	33	2	49.6	52.6	55.5	39	1	55.2	60.0	64.8
15	6	13.2	15.4	17.7	21	5	27.4	30.7	34.0	27	4	39.7	42.7	45.7	33	3	49.7	52.9	56.0	39	2	55.3	60.0	64.7
16	0	13.5	16.0	18.5	21	6	27.6	30.9	34.2	27	5	39.8	43.1	46.5	33	4	49.7	53.1	56.6	39	3	55.4	60.0	64.6
16	1	13.6	16.1	18.6	22	0	27.7	31.0	34.3	27	6	39.8	43.6	47.3	33	5	49.8	53.4	57.1	39	4	55.6	60.0	64.4
16	2	13.8	16.3	18.8	22	1	28.5	31.6	34.6	28	0	39.9	44.0	48.1	33	6	49.8	53.7	57.6	39	5	55.7	60.0	64.3
16	3	13.9	16.4	18.9	22	2	29.3	32.1	35.0	28	1	40.2	44.1	48.1	34	0	49.9	54.0	58.1	39	6	55.8	60.0	64.2
16	4	14.1	16.6	19.1	22	3	30.1	32.7	35.3	28	2	40.4	44.3	48.2	34	1	50.0	54.0	58.0	40	0	55.9	60.0	64.1
16	5	14.2	16.7	19.2	22	4	31.0	33.3	35.6	28	3	40.7	44.4	48.2	34	2	50.1	54.0	57.9	40	1	56.3	60.4	64.5
16	6	14.4	16.9	19.4	22	5	31.8	33.9	35.9	28	4	40.9	44.6	48.2	34	3	50.2	54.0	57.8	40	2	56.8	60.9	65.0
17	0	14.5	17.0	19.5	22	6	32.6	34.4	36.3	28	5	41.2	44.7	48.2	34	4	50.4	54.0	57.6	40	3	57.2	61.3	65.4
17	1	15.2	17.7	20.2	23	0	33.4	35.0	36.6	28	6	41.4	44.9	48.3	34	5	50.5	54.0	57.5	40	4	57.6	61.7	65.8
17	2	15.9	18.4	20.9	23	1	33.3	35.1	37.0	29	0	41.7	45.0	48.3	34	6	50.6	54.0	57.4	40	5	58.0	62.1	66.2
17	3	16.6	19.1	21.6	23	2	33.2	35.3	37.4	29	1	42.1	45.3	48.5	35	0	50.7	54.0	57.3	40	6	58.5	62.6	66.7
17	4	17.4	19.9	22.4	23	3	33.1	35.4	37.8	29	2	42.5	45.6	48.6	35	1	51.0	54.1	57.3	41	0	58.9	63.0	67.1
17	5	18.1	20.6	23.1	23	4	33.0	35.6	38.1	29	3	42.9	45.9	48.8	35	2	51.2	54.3	57.4	41	1	59.2	63.3	67.4
17	6	18.8	21.3	23.8	23	5	32.9	35.7	38.5	29	4	43.3	46.1	49.0	35	3	51.5	54.4	57.4	41	2	59.5	63.6	67.7
18	0	19.5	22.0	24.5	23	6	32.8	35.9	38.9	29	5	43.7	46.4	49.2	35	4	51.7	54.6	57.4	41	3	59.8	63.9	68.0
18	1	19.8	22.3	24.8	24	0	32.7	36.0	39.3	29	6	44.1	46.7	49.3	35	5	52.0	54.7	57.4	41	4	60.0	64.1	68.2
18	2	20.1	22.6	25.1	24	1	33.1	36.4	39.7	30	0	44.5	47.0	49.5	35	6	52.2	54.9	57.5	41	5	60.3	64.4	68.5
18	3	20.4	22.9	25.4	24	2	33.6	36.9	40.2	30	1	44.7	47.3	49.9	36	0	52.5	55.0	57.5	41	6	60.6	64.7	68.8
18	4	20.6	23.1	25.6	24	3	34.0	37.3	40.6	30	2	44.8	47.6	50.3	36	1	52.5	55.1	57.8	42	0	60.9	65.0	69.1
18	5	20.9	23.4	25.9	24	4	34.4	37.7	41.0	30	3	45.0	47.9	50.7	36	2	52.6	55.3	58.0					

Ulna Length, Hansmann

Hansmann M, Hackelöer B-J, Staudach A. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, 1985.

Wk	Day	5%	Mean	95%
12	0	7.0	0	0
12	1	7.4	0	0
12	2	7.9	0	0
12	3	8.3	0	0
12	4	8.7	0	0
12	5	9.1	0	0
12	6	9.6	0	0
13	0	10.0	5.0	15.0
13	1	10.4	5.4	15.4
13	2	10.9	5.9	15.9
13	3	11.3	6.3	16.3
13	4	11.7	6.7	16.7
13	5	12.1	7.1	17.1
13	6	12.6	7.6	17.6
14	0	13.0	8.0	18.0
14	1	13.4	8.4	18.4
14	2	13.9	8.9	18.9
14	3	14.3	9.3	19.3
14	4	14.7	9.7	19.7
14	5	15.1	10.1	20.1
14	6	15.6	10.6	20.6
15	0	16.0	11.0	21.0
15	1	16.3	11.3	21.3
15	2	16.6	11.6	21.6
15	3	16.9	11.9	21.9
15	4	17.1	12.1	22.1
15	5	17.4	12.4	22.4
15	6	17.7	12.7	22.7
16	0	18.0	13.0	23.0
16	1	18.4	13.4	23.4
16	2	18.9	13.9	23.9
16	3	19.3	14.3	24.3
16	4	19.7	14.7	24.7
16	5	20.1	15.1	25.1
16	6	20.6	15.6	25.6
17	0	21.0	16.0	26.0
17	1	21.4	16.4	26.4
17	2	21.9	16.9	26.9
17	3	22.3	17.3	27.3
17	4	22.7	17.7	27.7
17	5	23.1	18.1	28.1
17	6	23.6	18.6	28.6
18	0	24.0	19.0	29.0
18	1	24.3	19.3	29.3
18	2	24.6	19.6	29.6
18	3	24.9	19.9	29.9
18	4	25.1	20.1	30.1
18	5	25.4	20.4	30.4
18	6	25.7	20.7	30.7
19	0	26.0	21.0	31.0
19	1	26.4	21.4	31.4
19	2	26.9	21.9	31.9
19	3	27.3	22.3	32.3
19	4	27.7	22.7	32.7
19	5	28.1	23.1	33.1
19	6	28.6	23.6	33.6
20	0	29.0	24.0	34.0
20	1	29.3	24.3	34.3
20	2	29.6	24.6	34.6
20	3	29.9	24.9	34.9
20	4	30.1	25.1	35.1
20	5	30.4	25.4	35.4
20	6	30.7	25.7	35.7
21	0	31.0	26.0	36.0
21	1	31.3	26.3	36.3
21	2	31.6	26.6	36.6
21	3	31.9	26.9	36.9
21	4	32.1	27.1	37.1
21	5	32.4	27.4	37.4
21	6	32.7	27.7	37.7
22	0	33.0	28.0	38.0
22	1	33.4	28.4	38.4
22	2	33.9	28.9	38.9
22	3	34.3	29.3	39.3
22	4	34.7	29.7	39.7
22	5	35.1	30.1	40.1
22	6	35.6	30.6	40.6
23	0	36.0	31.0	41.0
23	1	36.3	31.3	41.3
23	2	36.6	31.6	41.6
23	3	36.9	31.9	41.9
23	4	37.1	32.1	42.1
23	5	37.4	32.4	42.4
23	6	37.7	32.7	42.7
24	0	38.0	33.0	43.0
24	1	38.3	33.3	43.3
24	2	38.6	33.6	43.6
24	3	38.9	33.9	43.9
24	4	39.1	34.1	44.1
24	5	39.4	34.4	44.4
24	6	39.7	34.7	44.7
25	0	40.0	35.0	45.0
25	1	40.3	35.3	45.3
25	2	40.6	35.6	45.6
25	3	40.9	35.9	45.9
25	4	41.1	36.1	46.1
25	5	41.4	36.4	46.4
25	6	41.7	36.7	46.7
26	0	42.0	37.0	47.0
26	1	42.3	37.3	47.3
26	2	42.6	37.6	47.6
26	3	42.9	37.9	47.9
26	4	43.1	38.1	48.1
26	5	43.4	38.4	48.4
26	6	43.7	38.7	48.7
27	0	44.0	39.0	49.0
27	1	44.3	39.3	49.3
27	2	44.6	39.6	49.6
27	3	44.9	39.9	49.9
27	4	45.1	40.1	50.1
27	5	45.4	40.4	50.4
27	6	45.7	40.7	50.7
28	0	46.0	41.0	51.0
28	1	46.3	41.3	51.3
28	2	46.6	41.6	51.6
28	3	46.9	41.9	51.9
28	4	47.1	42.1	52.1
28	5	47.4	42.4	52.4
28	6	47.7	42.7	52.7
29	0	48.0	43.0	53.0
29	1	48.1	43.1	53.1
29	2	48.3	43.3	53.3
29	3	48.4	43.4	53.4
29	4	48.6	43.6	53.6
29	5	48.7	43.7	53.7
29	6	48.9	43.9	53.9
30	0	49.0	44.0	54.0
30	1	49.3	44.3	54.3
30	2	49.6	44.6	54.6
30	3	49.9	44.9	54.9
30	4	50.1	45.1	55.1
30	5	50.4	45.4	55.4
30	6	50.7	45.7	55.7
31	0	51.0	46.0	56.0
31	1	51.3	46.3	56.3
31	2	51.6	46.6	56.6
31	3	51.9	46.9	56.9
31	4	52.1	47.1	57.1
31	5	52.4	47.4	57.4
31	6	52.7	47.7	57.7
32	0	53.0	48.0	58.0
32	1	53.1	48.1	58.1
32	2	53.3	48.3	58.3
32	3	53.4	48.4	58.4
32	4	53.6	48.6	58.6
32	5	53.7	48.7	58.7
32	6	53.9	48.9	58.9
33	0	54.0	49.0	59.0
33	1	54.3	49.3	59.3
33	2	54.6	49.6	59.6
33	3	54.9	49.9	59.9
33	4	55.1	50.1	60.1
33	5	55.4	50.4	60.4
33	6	55.7	50.7	60.7
34	0	56.0	51.0	61.0
34	1	56.1	51.1	61.1
34	2	56.3	51.3	61.3
34	3	56.4	51.4	61.4
34	4	56.6	51.6	61.6
34	5	56.7	51.7	61.7
34	6	56.9	51.9	61.9
35	0	57.0	52.0	62.0
35	1	57.1	52.1	62.1
35	2	57.3	52.3	62.3
35	3	57.4	52.4	62.4
35	4	57.6	52.6	62.6
35	5	57.7	52.7	62.7
35	6	57.9	52.9	62.9
36	0	58.0	53.0	63.0
36	1	58.3	53.3	63.3
36	2	58.6	53.6	63.6
36	3	58.9	53.9	63.9
36	4	59.1	54.1	64.1
36	5	59.4	54.4	64.4
36	6	59.7	54.7	64.7
37	0	60.0	55.0	65.0
37	1	60.1	55.1	65.1
37	2	60.3	55.3	65.3
37	3	60.4	55.4	65.4
37	4	60.6	55.6	65.6
37	5	60.7	55.7	65.7
37	6	60.9	55.9	65.9
38	0	61.0	56.0	66.0
38	1	61.1	56.1	66.1
38	2	61.3	56.3	66.3
38	3	61.4	56.4	66.4
38	4	61.6	56.6	66.6
38	5	61.7	56.7	66.7
38	6	61.9	56.9	66.9
39	0	62.0	57.0	67.0
39	1	62.1	57.1	67.1
39	2	62.3	57.3	67.3
39	3	62.4	57.4	67.4
39	4	62.6	57.6	67.6
39	5	62.7	57.7	67.7
39	6	62.9	57.9	67.9
40	0	63.0	58.0	68.0

Tibia Length, Jeanty

Jeanty P, Dramaix-Wilmet M, van Kerkem J, Petroons P, Schwers J. "Ultrasonic Evaluation of Fetal Limb Growth, Part II" *Radiology* 143:751, 1982.

Tibia(mm)=3.8822362 * MA(wk) - 0.03519398 * $MA(wk)^2$- 34.226237

Wk	Day	5%	Mean	95%
11	0	0	4.2	9.9
11	1	0	4.7	10.4
11	2	0	5.1	10.8
11	3	0	5.5	11.3
11	4	0.3	6.0	11.7
11	5	0.7	6.4	12.1
11	6	1.1	6.9	12.6
12	0	1.6	7.3	13.0
12	1	2.0	7.7	13.4
12	2	2.4	8.2	13.9
12	3	2.9	8.6	14.3
12	4	3.3	9.0	14.7
12	5	3.7	9.4	15.2
12	6	4.2	9.9	15.6
13	0	3.9	10.3	16.7
13	1	4.3	10.7	17.1
13	2	4.8	11.1	17.5
13	3	5.2	11.6	18.0
13	4	5.6	12.0	18.4
13	5	6.0	12.4	18.8
13	6	6.4	12.8	19.2
14	0	6.8	13.2	19.6
14	1	7.3	13.6	20.0
14	2	7.7	14.1	20.4
14	3	8.1	14.5	20.9
14	4	8.5	14.9	21.3
14	5	8.9	15.3	21.7
14	6	9.3	15.7	22.1
15	0	5.2	16.1	27.0
15	1	5.6	16.5	27.4
15	2	6.0	16.9	27.8
15	3	6.4	17.3	28.2
15	4	6.8	17.7	28.6
15	5	7.2	18.1	29.0
15	6	7.6	18.5	29.4
16	0	8.0	18.9	29.8
16	1	8.4	19.3	30.2
16	2	8.8	19.7	30.6
16	3	9.1	20.1	31.0
16	4	9.5	20.4	31.4
16	5	9.9	20.8	31.7
16	6	10.3	21.2	32.1
17	0	14.6	21.6	28.6
17	1	15.0	22.0	29.0
17	2	15.3	22.4	29.4
17	3	15.7	22.7	29.8
17	4	16.1	23.1	30.2
17	5	16.5	23.5	30.5
17	6	16.8	23.9	30.9
18	0	17.2	24.3	31.3
18	1	17.6	24.6	31.7
18	2	18.0	25.0	32.0
18	3	18.3	25.4	32.4
18	4	18.7	25.7	32.8
18	5	19.1	26.1	33.1
18	6	19.4	26.5	33.5
19	0	19.1	26.8	34.6
19	1	19.4	27.2	35.0
19	2	19.8	27.6	35.3
19	3	20.2	27.9	35.7
19	4	20.5	28.3	36.0
19	5	20.9	28.6	36.4
19	6	21.2	29.0	36.7
20	0	21.6	29.3	37.1
20	1	21.9	29.7	37.5
20	2	22.3	30.0	37.8
20	3	22.6	30.4	38.2
20	4	23.0	30.7	38.5
20	5	23.3	31.1	38.8
20	6	23.7	31.4	39.2
21	0	24.1	31.8	39.4
21	1	24.5	32.1	39.8
21	2	24.8	32.5	40.1
21	3	25.2	32.8	40.5
21	4	25.5	33.1	40.8
21	5	25.8	33.5	41.1
21	6	26.2	33.8	41.5
22	0	26.5	34.1	41.8
22	1	26.8	34.5	42.1
22	2	27.2	34.8	42.5
22	3	27.5	35.1	42.8
22	4	27.8	35.5	43.1
22	5	28.1	35.8	43.5
22	6	28.5	36.1	43.8
23	0	29.8	36.4	43.1
23	1	30.1	36.8	43.5
23	2	30.4	37.1	43.8
23	3	30.7	37.4	44.1
23	4	31.0	37.7	44.4
23	5	31.4	38.0	44.7
23	6	31.7	38.4	45.0
24	0	32.0	38.7	45.4
24	1	32.3	39.0	45.7
24	2	32.6	39.3	46.0
24	3	32.9	39.6	46.3
24	4	33.2	39.9	46.6
24	5	33.5	40.2	46.9
24	6	33.8	40.5	47.2
25	0	31.2	40.8	50.5
25	1	31.5	41.1	50.8
25	2	31.8	41.4	51.1
25	3	32.1	41.7	51.4
25	4	32.4	42.0	51.7
25	5	32.7	42.3	52.0
25	6	33.0	42.6	52.3
26	0	33.3	42.9	52.6
26	1	33.6	43.2	52.9
26	2	33.9	43.5	53.1
26	3	34.2	43.8	53.4
26	4	34.4	44.1	53.7
26	5	34.7	44.4	54.0
26	6	35.0	44.7	54.3
27	0	38.8	44.9	51.1
27	1	39.1	45.2	51.4
27	2	39.4	45.5	51.6
27	3	39.6	45.8	51.9
27	4	39.9	46.1	52.2
27	5	40.2	46.3	52.5
27	6	40.5	46.6	52.8
28	0	40.7	46.9	53.0
28	1	41.0	47.2	53.3
28	2	41.3	47.4	53.6
28	3	41.6	47.7	53.8
28	4	41.8	48.0	54.1
28	5	42.1	48.2	54.4
28	6	42.4	48.5	54.6
29	0	40.1	48.8	57.5
29	1	40.3	49.0	57.7
29	2	40.6	49.3	58.0
29	3	40.9	49.5	58.2
29	4	41.1	49.8	58.5
29	5	41.4	50.1	58.7
29	6	41.6	50.3	59.0
30	0	41.9	50.6	59.3
30	1	42.1	50.8	59.5
30	2	42.4	51.1	59.8
30	3	42.6	51.3	60.0
30	4	42.9	51.6	60.3
30	5	43.1	51.8	60.5
30	6	43.4	52.1	60.7
31	0	46.2	52.3	58.4
31	1	46.4	52.5	58.7
31	2	46.6	52.8	58.9
31	3	46.9	53.0	59.2
31	4	47.1	53.3	59.4
31	5	47.4	53.5	59.6
31	6	47.6	53.7	59.9
32	0	47.8	54.0	60.1
32	1	48.1	54.2	60.3
32	2	48.3	54.4	60.6
32	3	48.5	54.7	60.8
32	4	48.7	54.9	61.0
32	5	49.0	55.1	61.3
32	6	49.2	55.3	61.5
33	0	49.0	55.6	62.2
33	1	49.2	55.8	62.4
33	2	49.4	56.0	62.6
33	3	49.6	56.2	62.8
33	4	49.8	56.4	63.0
33	5	50.1	56.7	63.2
33	6	50.3	56.9	63.5
34	0	50.5	57.1	63.7
34	1	50.7	57.3	63.9
34	2	50.9	57.5	64.1
34	3	51.1	57.7	64.3
34	4	51.3	57.9	64.5
34	5	51.5	58.1	64.7
34	6	51.7	58.3	64.9
35	0	48.4	58.5	68.7
35	1	48.6	58.7	68.9
35	2	48.8	58.9	69.1
35	3	49.0	59.1	69.3
35	4	49.2	59.3	69.5
35	5	49.4	59.5	69.7
35	6	49.6	59.7	69.9
36	0	49.8	59.9	70.1
36	1	50.0	60.1	70.3
36	2	50.2	60.3	70.4
36	3	50.4	60.5	70.6
36	4	50.5	60.7	70.8
36	5	50.7	60.9	71.0
36	6	50.9	61.1	71.2
37	0	51.8	61.2	70.7
37	1	52.0	61.4	70.9
37	2	52.2	61.6	71.0
37	3	52.3	61.8	71.2
37	4	52.5	62.0	71.4
37	5	52.7	62.1	71.6
37	6	52.9	62.3	71.7
38	0	53.0	62.5	71.9
38	1	53.2	62.7	72.1
38	2	53.4	62.8	72.3
38	3	53.6	63.0	72.4
38	4	53.7	63.2	72.6
38	5	53.9	63.3	72.8
38	6	54.0	63.5	72.9
39	0	58.4	63.7	68.9
39	1	58.5	63.8	69.1
39	2	58.7	64.0	69.3
39	3	58.8	64.1	69.4
39	4	59.0	64.3	69.6
39	5	59.2	64.4	69.7
39	6	59.3	64.6	69.9
40	0	59.5	64.8	70.0

Tibia Length, Merz

Merz E, Kim-Kern M-S, Pehl S. "Ultrasonic Mensuration of Fetal Limb Bones in the Second and Third Trimesters." *Journal of Clinical Ultrasound* 15:175, March/April 1987.

5 & 95%: (2SD/3 * 1.645)

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
13	0	7.4	9.0	10.6	18	6	22.1	24.6	27.1	24	5	36.6	39.1	41.6	30	5	47.2	50.1	53.1	36	4	56.6	60.6	64.6
13	1	7.5	9.1	10.7	19	0	22.5	25.0	27.5	24	6	37.1	39.6	42.1	30	6	47.8	50.6	53.3	36	5	57.0	60.7	64.5
13	2	7.7	9.3	10.9	19	1	22.9	25.3	27.7	25	0	37.5	40.0	42.5	31	0	48.5	51.0	53.5	36	6	57.3	60.9	64.4
13	3	7.8	9.4	11.0	19	2	23.3	25.6	27.8	25	1	37.8	40.3	42.8	31	1	48.5	51.1	53.8	37	0	57.7	61.0	64.3
13	4	8.0	9.6	11.2	19	3	23.7	25.9	28.0	25	2	38.1	40.6	43.1	31	2	48.6	51.3	54.0	37	1	58.0	61.1	64.3
13	5	8.1	9.7	11.3	19	4	24.2	26.1	28.1	25	3	38.4	40.9	43.4	31	3	48.6	51.4	54.3	37	2	58.2	61.3	64.4
13	6	8.3	9.9	11.5	19	5	24.6	26.4	28.3	25	4	38.6	41.1	43.6	31	4	48.6	51.6	54.5	37	3	58.5	61.4	64.4
14	0	8.4	10.0	11.6	19	6	25.0	26.7	28.4	25	5	38.9	41.4	43.9	31	5	48.6	51.7	54.8	37	4	58.7	61.6	64.4
14	1	8.8	10.4	12.0	20	0	25.4	27.0	28.6	25	6	39.2	41.7	44.2	31	6	48.7	51.9	55.0	37	5	59.0	61.7	64.4
14	2	9.3	10.9	12.5	20	1	25.6	27.4	29.3	26	0	39.5	42.0	44.5	32	0	48.7	52.0	55.3	37	6	59.2	61.9	64.5
14	3	9.7	11.3	12.9	20	2	25.8	27.9	29.9	26	1	39.8	42.3	44.8	32	1	48.9	52.3	55.7	38	0	59.5	62.0	64.5
14	4	10.1	11.7	13.3	20	3	26.0	28.3	30.6	26	2	40.1	42.6	45.1	32	2	49.0	52.6	56.1	38	1	59.3	62.3	65.3
14	5	10.5	12.1	13.7	20	4	26.1	28.7	31.3	26	3	40.4	42.9	45.4	32	3	49.2	52.9	56.5	38	2	59.1	62.6	66.0
14	6	11.0	12.6	14.2	20	5	26.3	29.1	32.0	26	4	40.6	43.1	45.6	32	4	49.4	53.1	56.9	38	3	58.9	62.9	66.8
15	0	11.4	13.0	14.6	20	6	26.5	29.6	32.6	26	5	40.9	43.4	45.9	32	5	49.6	53.4	57.3	38	4	58.8	63.1	67.5
15	1	11.7	13.4	15.2	21	0	26.7	30.0	33.3	26	6	41.2	43.7	46.2	32	6	49.7	53.7	57.7	38	5	58.6	63.4	68.3
15	2	12.0	13.9	15.7	21	1	27.1	30.3	33.5	27	0	41.5	44.0	46.5	33	0	49.9	54.0	58.1	38	6	58.4	63.7	69.0
15	3	12.3	14.3	16.3	21	2	27.5	30.6	33.6	27	1	41.5	44.1	46.8	33	1	50.3	54.4	58.5	39	0	58.2	64.0	69.8
15	4	12.6	14.7	16.8	21	3	27.9	30.9	33.8	27	2	41.6	44.3	47.0	33	2	50.8	54.9	59.0	39	1	58.8	64.1	69.5
15	5	12.9	15.1	17.4	21	4	28.3	31.1	34.0	27	3	41.6	44.4	47.3	33	3	51.2	55.3	59.4	39	2	59.4	64.3	69.1
15	6	13.2	15.6	17.9	21	5	28.7	31.4	34.2	27	4	41.6	44.6	47.5	33	4	51.6	55.7	59.8	39	3	60.0	64.4	68.8
16	0	13.5	16.0	18.5	21	6	29.1	31.7	34.3	27	5	41.6	44.7	47.8	33	5	52.0	56.1	60.2	39	4	60.7	64.6	68.5
16	1	13.8	16.3	18.8	22	0	29.5	32.0	34.5	27	6	41.7	44.9	48.0	33	6	52.5	56.6	60.7	39	5	61.3	64.7	68.2
16	2	14.1	16.6	19.1	22	1	30.2	32.6	34.9	28	0	41.7	45.0	48.3	34	0	52.9	57.0	61.1	39	6	61.9	64.9	67.8
16	3	14.4	16.9	19.4	22	2	30.9	33.1	35.4	28	1	42.0	45.1	48.3	34	1	53.2	57.1	61.1	40	0	62.5	65.0	67.5
16	4	14.6	17.1	19.6	22	3	31.6	33.7	35.8	28	2	42.2	45.3	48.4	34	2	53.4	57.3	61.2	40	1	62.5	65.1	67.8
16	5	14.9	17.4	19.9	22	4	32.3	34.3	36.3	28	3	42.5	45.4	48.4	34	3	53.7	57.4	61.2	40	2	62.6	65.3	68.0
16	6	15.2	17.7	20.2	22	5	33.0	34.9	36.7	28	4	42.7	45.6	48.4	34	4	53.9	57.6	61.2	40	3	62.6	65.4	68.3
17	0	15.5	18.0	20.5	22	6	33.7	35.4	37.2	28	5	43.0	45.7	48.4	34	5	54.2	57.7	61.2	40	4	62.6	65.6	68.5
17	1	16.1	18.6	21.1	23	0	34.4	36.0	37.6	29	0	43.5	46.0	48.5	34	6	54.4	57.9	61.3	40	5	62.6	65.7	68.8
17	2	16.6	19.1	21.6	23	1	34.4	36.1	37.9	29	1	43.6	46.3	49.0	35	0	54.7	58.0	61.3	40	6	62.7	65.9	69.0
17	3	17.2	19.7	22.2	23	2	34.4	36.3	38.1	29	2	43.6	46.6	49.5	35	1	54.8	58.3	61.8	41	0	62.7	66.0	69.3
17	4	17.8	20.3	22.8	23	3	34.4	36.4	38.4	29	3	43.7	46.9	50.0	35	2	54.8	58.6	62.3	41	1	62.9	66.3	69.7
17	5	18.4	20.9	23.4	23	4	34.5	36.6	38.7	29	4	43.7	47.1	50.6	35	3	54.9	58.9	62.8	41	2	63.0	66.6	70.1
17	6	18.9	21.4	23.9	23	5	34.5	36.7	39.0	29	5	43.8	47.4	51.1	35	4	54.9	59.1	63.4	41	3	63.2	66.9	70.5
18	0	19.5	22.0	24.5	23	6	34.5	36.9	39.2	29	6	43.8	47.7	51.6	35	5	55.0	59.4	63.9	41	4	63.4	67.1	70.9
18	1	19.9	22.4	24.9	24	0	34.5	37.0	39.5	30	0	43.9	48.0	52.1	35	6	55.0	59.7	64.4	41	5	63.6	67.4	71.3
18	2	20.4	22.9	25.4	24	1	34.9	37.4	39.9	30	1	44.6	48.4	52.3	36	0	55.1	60.0	64.9	41	6	63.7	67.7	71.7
18	3	20.8	23.3	25.8	24	2	35.4	37.9	40.4	30	2	45.2	48.9	52.5	36	1	55.5	60.1	64.8	42	0	63.9	68.0	72.1
18	4	21.2	23.7	26.2	24	3	35.8	38.3	40.8	30	3	45.9	49.3	52.7	36	2	55.8	60.3	64.7					
18	5	21.6	24.1	26.6	24	4	36.2	38.7	41.2	30	4	46.5	49.7	52.9	36	3	56.2	60.4	64.6					

Tibia Length, Hansmann

Hansmann M, Hackelöer B-J, Staudach A. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, 1985.

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
12	0	0	7.0	0	17	5	16.4	21.4	26.4	23	3	30.9	35.9	40.9	29	1	43.3	48.3	53.3	34	6	52.9	57.9	63.7
12	1	0	7.4	0	17	6	16.7	21.7	26.7	23	4	31.1	36.1	41.1	29	2	43.6	48.6	53.6	35	0	53.0	58.0	64.0
12	2	0	7.9	0	18	0	17.0	22.0	27.0	23	5	31.4	36.4	41.4	29	3	43.9	48.9	53.9	35	1	53.3	58.3	64.1
12	3	0	8.3	0	18	1	17.4	22.4	27.4	23	6	31.7	36.7	41.7	29	4	44.1	49.1	54.1	35	2	53.6	58.6	64.3
12	4	0	8.7	0	18	2	17.9	22.9	27.9	24	0	32.0	37.0	42.0	29	5	44.4	49.4	54.4	35	3	53.9	58.9	64.4
12	5	0	9.1	0	18	3	18.3	23.3	28.3	24	1	32.3	37.4	42.4	29	6	44.7	49.7	54.7	35	4	54.1	59.1	64.6
12	6	0	9.6	0	18	4	18.7	23.7	28.7	24	2	32.6	37.9	42.9	30	0	45.0	50.0	55.0	35	5	54.4	59.4	64.7
13	0	0	10.0	0	18	5	19.1	24.1	29.1	24	3	32.9	38.3	43.3	30	1	45.3	50.3	55.3	35	6	54.7	59.7	64.9
13	1	0	10.3	0	18	6	19.6	24.6	29.6	24	4	33.1	38.7	43.7	30	2	45.6	50.6	55.6	36	0	55.0	60.0	65.0
13	2	0	10.6	0	19	0	20.0	25.0	30.0	24	5	33.4	39.1	44.1	30	3	45.9	50.9	55.9	36	1	55.1	60.1	65.3
13	3	0	10.9	0	19	1	20.3	25.3	30.4	24	6	33.7	39.6	44.6	30	4	46.1	51.1	56.1	36	2	55.3	60.3	65.6
13	4	0	11.1	0	19	2	20.6	25.6	30.9	25	0	34.0	40.0	45.0	30	5	46.4	51.4	56.4	36	3	55.4	60.4	65.9
13	5	0	11.4	0	19	3	20.9	25.9	31.3	25	1	34.4	40.3	45.3	30	6	46.7	51.7	56.7	36	4	55.6	60.6	66.1
13	6	0	11.7	0	19	4	21.1	26.1	31.7	25	2	34.9	40.6	45.6	31	0	47.0	52.0	57.0	36	5	55.7	60.7	66.4
14	0	7.0	12.0	17.0	19	5	21.4	26.4	32.1	25	3	35.3	40.9	45.9	31	1	47.1	52.3	57.3	36	6	55.9	60.9	66.7
14	1	7.3	12.4	17.4	19	6	21.7	26.7	32.6	25	4	35.7	41.1	46.1	31	2	47.3	52.6	57.6	37	0	56.0	61.0	67.0
14	2	7.6	12.9	17.9	20	0	22.0	27.0	33.0	25	5	36.1	41.4	46.4	31	3	47.4	52.9	57.9	37	1	56.3	61.3	67.1
14	3	7.9	13.3	18.3	0	1	22.4	27.4	33.3	25	6	36.6	41.7	46.7	31	4	47.6	53.1	58.1	37	2	56.6	61.6	67.3
14	4	8.1	13.7	18.7	20	2	22.9	27.9	33.6	26	0	37.0	42.0	47.0	31	5	47.7	53.4	58.4	37	3	56.9	61.9	67.4
14	5	8.4	14.1	19.1	20	3	23.3	28.3	33.9	26	1	37.3	42.3	47.3	31	6	47.9	53.7	58.7	37	4	57.1	62.1	67.6
14	6	8.7	14.6	19.6	20	4	23.7	28.7	34.1	26	2	37.6	42.6	47.6	32	0	48.0	54.0	59.0	37	5	57.4	62.4	67.7
15	0	9.0	15.0	20.0	20	5	24.1	29.1	34.4	26	3	37.9	42.9	47.9	32	1	48.3	54.1	59.1	37	6	57.7	62.7	67.9
15	1	9.4	15.3	20.3	20	6	24.6	29.6	34.7	26	4	38.1	43.1	48.1	32	2	48.6	54.3	59.3	38	0	58.0	63.0	68.0
15	2	9.9	15.6	20.6	21	0	25.0	30.0	35.0	26	5	38.4	43.4	48.4	32	3	48.9	54.4	59.4	38	1	58.1	63.1	68.1
15	3	10.3	15.9	20.9	21	1	25.3	30.3	35.4	26	6	38.7	43.7	48.7	32	4	49.1	54.6	59.6	38	2	58.3	63.3	68.3
15	4	10.7	16.1	21.1	21	2	25.6	30.6	35.9	27	0	39.0	44.0	49.0	32	5	49.4	54.7	59.7	38	3	58.4	63.4	68.4
15	5	11.1	16.4	21.4	21	3	25.9	30.9	36.3	27	1	39.3	44.3	49.3	32	6	49.7	54.9	59.9	38	4	58.6	63.6	68.6
15	6	11.6	16.7	21.7	21	4	26.1	31.1	36.7	27	2	39.6	44.6	49.6	33	0	50.0	55.0	60.0	38	5	58.7	63.7	68.7
16	0	12.0	17.0	22.0	21	5	26.4	31.4	37.1	27	3	39.9	44.9	49.9	33	1	50.3	55.3	60.3	38	6	58.9	63.9	68.9
16	1	12.4	17.4	22.4	21	6	26.7	31.7	37.6	27	4	40.1	45.1	50.1	33	2	50.6	55.6	60.6	39	0	59.0	64.0	69.0
16	2	12.9	17.9	22.9	22	0	27.0	32.0	38.0	27	5	40.4	45.4	50.4	33	3	50.9	55.9	60.9	39	1	59.3	64.3	69.3
16	3	13.3	18.3	23.3	22	1	27.4	32.4	38.3	27	6	40.7	45.7	50.7	33	4	51.1	56.1	61.1	39	2	59.6	64.6	69.6
16	4	13.7	18.7	23.7	22	2	27.9	32.9	38.6	28	0	41.0	46.0	51.0	33	5	51.4	56.4	61.4	39	3	59.9	64.9	69.9
16	5	14.1	19.1	24.1	22	3	28.3	33.3	38.9	28	1	41.3	46.3	51.3	33	6	51.7	56.7	61.7	39	4	60.1	65.1	70.1
16	6	14.6	19.6	24.6	22	4	28.7	33.7	39.1	28	2	41.6	46.6	51.6	34	0	52.0	57.0	62.0	39	5	60.4	65.4	70.4
17	0	15.0	20.0	25.0	22	5	29.1	34.1	39.4	28	3	41.9	46.9	51.9	34	1	52.1	57.1	62.3	39	6	60.7	65.7	70.7
17	1	15.3	20.3	25.3	22	6	29.6	34.6	39.7	28	4	42.1	47.1	52.1	34	2	52.3	57.3	62.6	40	0	61.0	66.0	71.0
17	2	15.6	20.6	25.6	23	0	30.0	35.0	40.0	28	5	42.4	47.4	52.4	34	3	52.4	57.4	62.9					
17	3	15.9	20.9	25.9	23	1	30.3	35.3	40.3	28	6	42.7	47.7	52.7	34	4	52.6	57.6	63.1					
17	4	16.1	21.1	26.1	23	2	30.6	35.6	40.6	29	0	43.0	48.0	53.0	34	5	52.7	57.7	63.4					

Foot Length, Mercer

Mercer BM, Sklar S, Shariatmadar A, Gillieson MS, Dalton ME. "Fetal foot length as a predictor of gestational age." *American Journal of Obstetrics and Gynecology* 156(2):350, 1987.

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
12	0	7.2	8.0	8.8	17	5	23.9	26.1	28.6	23	3	39.2	43.3	46.9	29	1	52.6	58.3	63.3	34	6	65.0	70.7	77.3
12	1	7.6	8.4	9.3	17	6	24.2	26.6	29.0	23	4	39.6	43.7	47.5	29	2	53.0	58.6	63.7	35	0	65.2	71.0	77.6
12	2	8.0	8.9	9.7	18	0	24.5	27.0	29.5	23	5	40.0	44.1	48.0	29	3	53.5	58.9	64.1	35	1	65.6	71.4	78.0
12	3	8.5	9.3	10.1	18	1	25.0	27.4	30.0	23	6	40.5	44.6	48.6	29	4	53.9	59.1	64.5	35	2	65.9	71.9	78.4
12	4	8.9	9.7	10.5	18	2	25.4	27.9	30.6	24	0	40.9	45.0	49.1	29	5	54.3	59.4	65.0	35	3	66.2	72.3	78.9
12	5	9.3	10.1	11.0	18	3	25.8	28.3	31.1	24	1	41.2	45.3	49.5	29	6	54.7	59.7	65.4	35	4	66.5	72.7	79.3
12	6	9.7	10.6	11.4	18	4	26.2	28.7	31.7	24	2	41.5	45.6	49.9	30	0	55.1	60.0	65.8	35	5	66.8	73.1	79.7
13	0	10.2	11.0	11.8	18	5	26.7	29.1	32.2	24	3	41.7	45.9	50.3	30	1	55.4	60.3	65.9	35	6	67.1	73.6	80.2
13	1	10.6	11.6	12.4	18	6	27.1	29.6	32.7	24	4	42.0	46.1	50.7	30	2	55.6	60.6	66.1	36	0	67.4	74.0	80.6
13	2	11.1	12.1	13.0	19	0	27.5	30.0	33.3	24	5	42.3	46.4	51.1	30	3	55.9	60.9	66.3	36	1	67.6	74.3	80.9
13	3	11.5	12.7	13.5	19	1	28.0	30.4	33.7	24	6	42.6	46.7	51.5	30	4	56.2	61.1	66.4	36	2	67.8	74.6	81.2
13	4	12.0	13.3	14.1	19	2	28.4	30.9	34.1	25	0	42.9	47.0	51.9	30	5	56.5	61.4	66.6	36	3	67.9	74.9	81.4
13	5	12.4	13.9	14.7	19	3	28.8	31.3	34.6	25	1	43.3	47.4	52.2	30	6	56.8	61.7	66.8	36	4	68.1	75.1	81.7
13	6	12.9	14.4	15.3	19	4	29.2	31.7	35.0	25	2	43.7	47.9	52.6	31	0	57.1	62.0	66.9	36	5	68.3	75.4	82.0
14	0	13.4	15.0	15.8	19	5	29.7	32.1	35.4	25	3	44.2	48.3	52.9	31	1	57.4	62.4	67.5	36	6	68.4	75.7	82.3
14	1	13.8	15.4	16.4	19	6	30.1	32.6	35.9	25	4	44.6	48.7	53.2	31	2	57.7	62.9	68.0	37	0	68.6	76.0	82.6
14	2	14.2	15.9	16.9	20	0	30.5	33.0	36.3	25	5	45.0	49.1	53.5	31	3	58.0	63.3	68.6	37	1	68.9	76.3	82.9
14	3	14.6	16.3	17.5	20	1	30.8	33.4	36.7	25	6	45.5	49.6	53.8	31	4	58.3	63.7	69.1	37	2	69.2	76.6	83.2
14	4	15.1	16.7	18.0	20	2	31.2	33.9	37.1	26	0	45.9	50.0	54.1	31	5	58.6	64.1	69.7	37	3	69.5	76.9	83.4
14	5	15.5	17.1	18.6	20	3	31.5	34.3	37.6	26	1	46.2	50.4	54.5	31	6	58.9	64.6	70.2	37	4	69.7	77.1	83.7
14	6	15.9	17.6	19.1	20	4	31.8	34.7	38.0	26	2	46.5	50.9	55.0	32	0	59.2	65.0	70.8	37	5	70.0	77.4	84.0
15	0	16.4	18.0	19.6	20	5	32.1	35.1	38.4	26	3	46.8	51.3	55.4	32	1	59.5	65.3	71.0	37	6	70.3	77.7	84.3
15	1	16.8	18.4	20.1	20	6	32.4	35.6	38.9	26	4	47.1	51.7	55.8	32	2	59.8	65.6	71.3	38	0	70.6	78.0	84.6
15	2	17.2	18.9	20.5	21	0	32.7	36.0	39.3	26	5	47.4	52.1	56.3	32	3	60.1	65.9	71.6	38	1	70.9	78.3	84.9
15	3	17.6	19.3	20.9	21	1	33.1	36.4	39.7	26	6	47.8	52.6	56.7	32	4	60.4	66.1	71.9	38	2	71.2	78.6	85.2
15	4	18.1	19.7	21.4	21	2	33.6	36.9	40.1	27	0	48.1	53.0	57.1	32	5	60.7	66.4	72.2	38	3	71.5	78.9	85.4
15	5	18.5	20.1	21.8	21	3	34.0	37.3	40.6	27	1	48.4	53.3	57.5	32	6	61.0	66.7	72.5	38	4	71.7	79.1	85.7
15	6	18.9	20.6	22.2	21	4	34.4	37.7	41.0	27	2	48.6	53.6	57.9	33	0	61.2	67.0	72.8	38	5	72.0	79.4	86.0
16	0	19.4	21.0	22.6	21	5	34.9	38.1	41.4	27	3	48.9	53.9	58.3	33	1	61.5	67.3	73.2	38	6	72.3	79.7	86.3
16	1	19.8	21.4	23.2	21	6	35.3	38.6	41.9	27	4	49.2	54.1	58.7	33	2	61.8	67.6	73.6	39	0	72.6	80.0	86.6
16	2	20.2	21.9	23.7	22	0	35.7	39.0	42.3	27	5	49.5	54.4	59.1	33	3	62.1	67.9	74.0	39	1	72.7	80.1	86.8
16	3	20.6	22.3	24.3	22	1	36.0	39.4	42.7	27	6	49.8	54.7	59.5	33	4	62.4	68.1	74.4	39	2	72.9	80.3	87.1
16	4	21.1	22.7	24.8	22	2	36.3	39.9	43.1	28	0	50.1	55.0	59.9	33	5	62.7	68.4	74.8	39	3	73.0	80.4	87.4
16	5	21.5	23.1	25.4	22	3	36.6	40.3	43.6	28	1	50.4	55.4	60.4	33	6	63.0	68.7	75.2	39	4	73.2	80.6	87.6
16	6	21.9	23.6	25.9	22	4	37.0	40.7	44.0	28	2	50.7	55.9	60.8	34	0	63.2	69.0	75.6	39	5	73.3	80.7	87.9
17	0	22.4	24.0	26.5	22	5	37.3	41.1	44.4	28	3	51.0	56.3	61.2	34	1	63.5	69.3	75.9	39	6	73.5	80.9	88.1
17	1	22.7	24.4	26.9	22	6	37.6	41.6	44.9	28	4	51.3	56.7	61.6	34	2	63.8	69.6	76.2	40	0	73.6	81.0	88.4
17	2	23.0	24.9	27.3	23	0	37.9	42.0	45.3	28	5	51.6	57.1	62.1	34	3	64.1	69.9	76.4					
17	3	23.3	25.3	27.8	23	1	38.3	42.4	45.8	28	6	51.9	57.6	62.5	34	4	64.4	70.1	76.7					
17	4	23.6	25.7	28.2	23	2	38.7	42.9	46.4	29	0	52.2	58.0	62.9	34	5	64.7	70.4	77.0					

Thoracic Circumference, Chitkara

Chitkara U, Rosenberg J, Chervenak FA, Berkowitz GS, Levine R, Fagerstrom RM, Walker B, Berkowitz RL. "Prenatal sonographic assessment of the fetal thorax: Normal values." *American Journal of Obstetrics and Gynecology* 156:1069, 1987.

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
16	0	6.4	9.1	11.9	20	6	10.9	13.6	16.3	25	5	15.2	17.9	20.7	30	4	19.6	22.4	25.1	35	3	24.1	26.8	29.5
16	1	6.5	9.2	12.0	21	0	11.0	13.7	16.4	25	6	15.4	18.1	20.9	30	5	19.7	22.5	25.2	35	4	24.2	26.9	29.6
16	2	6.7	9.4	12.2	21	1	11.1	13.8	16.5	26	0	15.5	18.2	21.0	30	6	19.9	22.7	25.4	35	5	24.3	27.0	29.7
16	3	6.8	9.5	12.3	21	2	11.3	14.0	16.7	26	1	15.6	18.3	21.1	31	0	20.0	22.8	25.5	35	6	24.5	27.2	29.9
16	4	6.9	9.6	12.4	21	3	11.4	14.1	16.8	26	2	15.8	18.5	21.3	31	1	20.1	22.9	25.6	36	0	24.6	27.3	30.0
16	5	7.0	9.7	12.5	21	4	11.5	14.2	16.9	26	3	15.9	18.6	21.4	31	2	20.3	23.1	25.8	36	1	24.7	27.4	30.1
16	6	7.2	9.9	12.7	21	5	11.6	14.3	17.0	26	4	16.0	18.7	21.5	31	3	20.4	23.2	25.9	36	2	24.9	27.6	30.3
17	0	7.3	10.0	12.8	21	6	11.8	14.5	17.2	26	5	16.1	18.8	21.6	31	4	20.5	23.3	26.0	36	3	25.0	27.7	30.4
17	1	7.4	10.1	12.9	22	0	11.9	14.6	17.3	26	6	16.3	19.0	21.8	31	5	20.6	23.4	26.1	36	4	25.1	27.8	30.5
17	2	7.6	10.3	13.1	22	1	12.0	14.7	17.4	27	0	16.4	19.1	21.9	31	6	20.8	23.6	26.3	36	5	25.2	27.9	30.6
17	3	7.7	10.4	13.2	22	2	12.2	14.9	17.6	27	1	16.5	19.2	22.0	32	0	20.9	23.7	26.4	36	6	25.4	28.1	30.8
17	4	7.8	10.6	13.3	22	3	12.3	15.0	17.7	27	2	16.7	19.4	22.2	32	1	21.0	23.8	26.5	37	0	25.5	28.2	30.9
17	5	7.9	10.7	13.4	22	4	12.4	15.1	17.8	27	3	16.8	19.5	22.3	32	2	21.2	24.0	26.7	37	1	25.6	28.3	31.0
17	6	8.1	10.9	13.6	22	5	12.5	15.2	17.9	27	4	16.9	19.6	22.4	32	3	21.3	24.1	26.8	37	2	25.8	28.5	31.2
18	0	8.2	11.0	13.7	22	6	12.7	15.4	18.1	27	5	17.0	19.7	22.5	32	4	21.4	24.2	26.9	37	3	25.9	28.6	31.3
18	1	8.3	11.1	13.8	23	0	12.8	15.5	18.2	27	6	17.2	19.9	22.7	32	5	21.5	24.3	27.0	37	4	26.0	28.7	31.5
18	2	8.5	11.3	14.0	23	1	12.9	15.6	18.3	28	0	17.3	20.0	22.8	32	6	21.7	24.5	27.2	37	5	26.1	28.8	31.6
18	3	8.6	11.4	14.1	23	2	13.1	15.8	18.5	28	1	17.4	20.1	22.9	33	0	21.8	24.6	27.3	37	6	26.3	29.0	31.8
18	4	8.7	11.5	14.2	23	3	13.2	15.9	18.6	28	2	17.6	20.3	23.1	33	1	21.9	24.7	27.4	38	0	26.4	29.1	31.9
18	5	8.8	11.6	14.3	23	4	13.3	16.0	18.7	28	3	17.7	20.4	23.2	33	2	22.1	24.9	27.6	38	1	26.5	29.2	32.0
18	6	9.0	11.8	14.5	23	5	13.4	16.1	18.8	28	4	17.8	20.6	23.3	33	3	22.2	25.0	27.7	38	2	26.7	29.4	32.2
19	0	9.1	11.9	14.6	23	6	13.6	16.3	19.0	28	5	17.9	20.7	23.4	33	4	22.4	25.1	27.8	38	3	26.8	29.5	32.3
19	1	9.2	12.0	14.7	24	0	13.7	16.4	19.1	28	6	18.1	20.9	23.6	33	5	22.5	25.2	27.9	38	4	26.9	29.6	32.4
19	2	9.4	12.2	14.9	24	1	13.8	16.5	19.2	29	0	18.2	21.0	23.7	33	6	22.7	25.4	28.1	38	5	27.0	29.7	32.5
19	3	9.5	12.3	15.0	24	2	14.0	16.7	19.4	29	1	18.3	21.1	23.8	34	0	22.8	25.5	28.2	38	6	27.2	29.9	32.7
19	4	9.6	12.4	15.1	24	3	14.1	16.8	19.5	29	2	18.5	21.3	24.0	34	1	22.9	25.6	28.3	39	0	27.3	30.0	32.8
19	5	9.7	12.5	15.2	24	4	14.2	16.9	19.6	29	3	18.6	21.4	24.1	34	2	23.1	25.8	28.5	39	1	27.4	30.1	32.9
19	6	9.9	12.7	15.4	24	5	14.3	17.0	19.7	29	4	18.7	21.5	24.2	34	3	23.2	25.9	28.6	39	2	27.6	30.3	33.1
20	0	10.0	12.8	15.5	24	6	14.5	17.2	19.9	29	5	18.8	21.6	24.3	34	4	23.3	26.0	28.7	39	3	27.7	30.4	33.2
20	1	10.1	12.9	15.6	25	0	14.6	17.3	20.0	29	6	19.0	21.8	24.5	34	5	23.4	26.1	28.8	39	4	27.8	30.5	33.3
20	2	10.3	13.1	15.8	25	1	14.7	17.4	20.1	30	0	19.1	21.9	24.6	34	6	23.6	26.3	29.0	39	5	27.9	30.6	33.4
20	3	10.4	13.2	15.9	25	2	14.9	17.6	20.3	30	1	19.2	22.0	24.7	35	0	23.7	26.4	29.1	39	6	28.1	30.8	33.6
20	4	10.6	13.3	16.0	25	3	15.0	17.7	20.4	30	2	19.4	22.2	24.9	35	1	23.8	26.5	29.2	40	0	28.2	30.9	33.7
20	5	10.7	13.4	16.1	25	4	15.1	17.8	20.6	30	3	19.5	22.3	25.0	35	2	24.0	26.7	29.4					

Clavicle Length, Yarkoni

Yarkoni S, Schmidt W, Jeanty P, Reece EA, Hobbins JC. "Clavicular Measurement: A New Biometric Parameter for Fetal Evaluation." *Journal of Ultrasound in Medicine* 4:467, 1985.

CL(mm)=1.118303 + 0.9788639 * MA(wks)
±Standard Deviation = 2.92 mm
5th & 95%: ±4.8 mm

Wk	Day	5%	Mean	95%
15	0	11.0	15.8	20.6
15	1	11.1	15.9	20.7
15	2	11.3	16.1	20.9
15	3	11.4	16.2	21.0
15	4	11.6	16.4	21.2
15	5	11.7	16.5	21.3
15	6	11.8	16.6	21.4
16	0	12.0	16.8	21.6
16	1	12.1	16.9	21.7
16	2	12.3	17.1	21.9
16	3	12.4	17.2	22.0
16	4	12.5	17.3	22.1
16	5	12.7	17.5	22.3
16	6	12.8	17.6	22.4
17	0	13.0	17.8	22.6
17	1	13.1	17.9	22.7
17	2	13.2	18.0	22.8
17	3	13.4	18.2	23.0
17	4	13.5	18.3	23.1
17	5	13.7	18.5	23.3
17	6	13.8	18.6	23.4
18	0	13.9	18.7	23.5
18	1	14.1	18.9	23.7
18	2	14.2	19.0	23.8
18	3	14.4	19.2	24.0
18	4	14.5	19.3	24.1
18	5	14.6	19.4	24.2
18	6	14.8	19.6	24.4
19	0	14.9	19.7	24.5
19	1	15.1	19.9	24.7
19	2	15.2	20.0	24.8
19	3	15.3	20.1	24.9
19	4	15.5	20.3	25.1
19	5	15.6	20.4	25.2
19	6	15.8	20.6	25.4
20	0	15.9	20.7	25.5
20	1	16.0	20.8	25.6
20	2	16.2	21.0	25.8
20	3	16.3	21.1	25.9
20	4	16.5	21.3	26.1
20	5	16.6	21.4	26.2
20	6	16.7	21.5	26.3
21	0	16.9	21.7	26.5
21	1	17.0	21.8	26.6
21	2	17.2	22.0	26.8
21	3	17.3	22.1	26.9
21	4	17.4	22.2	27.0
21	5	17.6	22.4	27.2
21	6	17.7	22.5	27.3
22	0	17.9	22.7	27.5
22	1	18.0	22.8	27.6
22	2	18.1	22.9	27.7
22	3	18.3	23.1	27.9
22	4	18.4	23.2	28.0
22	5	18.6	23.4	28.2
22	6	18.7	23.5	28.3
23	0	18.8	23.6	28.4
23	1	19.0	23.8	28.6
23	2	19.1	23.9	28.7
23	3	19.3	24.1	28.9
23	4	19.4	24.2	29.0
23	5	19.5	24.3	29.1
23	6	19.7	24.5	29.3
24	0	19.8	24.6	29.4
24	1	20.0	24.8	29.6
24	2	20.1	24.9	29.7
24	3	20.2	25.0	29.8
24	4	20.4	25.2	30.0
24	5	20.5	25.3	30.1
24	6	20.7	25.5	30.3
25	0	20.8	25.6	30.4
25	1	20.9	25.7	30.5
25	2	21.1	25.9	30.7
25	3	21.2	26.0	30.8
25	4	21.3	26.1	30.9
25	5	21.5	26.3	31.1
25	6	21.6	26.4	31.2
26	0	21.8	26.6	31.4
26	1	21.9	26.7	31.5
26	2	22.0	26.8	31.6
26	3	22.2	27.0	31.8
26	4	22.3	27.1	31.9
26	5	22.5	27.3	32.1
26	6	22.6	27.4	32.2
27	0	22.7	27.5	32.3
27	1	22.9	27.7	32.5
27	2	23.0	27.8	32.6
27	3	23.2	28.0	32.8
27	4	23.3	28.1	32.9
27	5	23.4	28.2	33.0
27	6	23.6	28.4	33.2
28	0	23.7	28.5	33.3
28	1	23.9	28.7	33.5
28	2	24.0	28.8	33.6
28	3	24.1	28.9	33.7
28	4	24.3	29.1	33.9
28	5	24.4	29.2	34.0
28	6	24.6	29.4	34.2
29	0	24.7	29.5	34.3
29	1	24.8	29.6	34.4
29	2	25.0	29.8	34.6
29	3	25.1	29.9	34.7
29	4	25.3	30.1	34.9
29	5	25.4	30.2	35.0
29	6	25.5	30.3	35.1
30	0	25.7	30.5	35.3
30	1	25.8	30.6	35.4
30	2	26.0	30.8	35.6
30	3	26.1	30.9	35.7
30	4	26.2	31.0	35.8
30	5	26.4	31.2	36.0
30	6	26.5	31.3	36.1
31	0	26.7	31.5	36.3
31	1	26.8	31.6	36.4
31	2	26.9	31.7	36.5
31	3	27.1	31.9	36.7
31	4	27.2	32.0	36.8
31	5	27.4	32.2	37.0
31	6	27.5	32.3	37.1
32	0	27.6	32.4	37.2
32	1	27.8	32.6	37.4
32	2	27.9	32.7	37.5
32	3	28.1	32.9	37.7
32	4	28.2	33.0	37.8
32	5	28.3	33.1	37.9
32	6	28.5	33.3	38.1
33	0	28.6	33.4	38.2
33	1	28.8	33.6	38.4
33	2	28.9	33.7	38.5
33	3	29.0	33.8	38.6
33	4	29.2	34.0	38.8
33	5	29.3	34.1	38.9
33	6	29.5	34.3	39.1
34	0	29.6	34.4	39.2
34	1	29.7	34.5	39.3
34	2	29.9	34.7	39.5
34	3	30.0	34.8	39.6
34	4	30.2	35.0	39.8
34	5	30.3	35.1	39.9
34	6	30.4	35.2	40.0
35	0	30.6	35.4	40.2
35	1	30.7	35.5	40.3
35	2	30.9	35.7	40.5
35	3	31.0	35.8	40.6
35	4	31.1	35.9	40.7
35	5	31.3	36.1	40.9
35	6	31.4	36.2	41.0
36	0	31.6	36.4	41.2
36	1	31.7	36.5	41.3
36	2	31.8	36.6	41.4
36	3	32.0	36.8	41.6
36	4	32.1	36.9	41.7
36	5	32.3	37.1	41.9
36	6	32.4	37.2	42.0
37	0	32.5	37.3	42.1
37	1	32.7	37.5	42.3
37	2	32.8	37.6	42.4
37	3	33.0	37.8	42.6
37	4	33.1	37.9	42.7
37	5	33.2	38.0	42.8
37	6	33.4	38.2	43.0
38	0	33.5	38.3	43.1
38	1	33.7	38.5	43.3
38	2	33.8	38.6	43.4
38	3	33.9	38.7	43.5
38	4	34.1	38.9	43.7
38	5	34.2	39.0	43.8
38	6	34.4	39.2	44.0
39	0	34.5	39.3	44.1
39	1	34.6	39.4	44.2
39	2	34.8	39.6	44.4
39	3	34.9	39.7	44.5
39	4	35.1	39.9	44.7
39	5	35.2	40.0	44.8
39	6	35.3	40.1	44.9
40	0	35.5	40.3	45.1

Renal Length, Bertagnoli

Bertagnoli L, Lalatta F, Gallicchio R, Fantuzzi M, Rusca M, Zorzoli A, Deter RL. "Quantitative Characterization of the Growth of the Fetal Kidney." *Journal of Clinical Ultrasound* 11:349, 1983.

RL(mm)=16.8933 + 0.0132 * MA^2(wks) 1 Standard Deviation = 1.259 mm 5 & 95%: 2.07 mm

Wk	Day	5%	Mean	95%
24	0	22.4	24.5	26.6
24	1	22.5	24.6	26.7
24	2	22.6	24.7	26.7
24	3	22.7	24.8	26.8
24	4	22.8	24.9	26.9
24	5	22.9	25.0	27.0
24	6	23.0	25.0	27.1
25	0	23.1	25.1	27.2
25	1	23.2	25.2	27.3
25	2	23.3	25.3	27.4
25	3	23.4	25.4	27.5
25	4	23.5	25.5	27.6
25	5	23.6	25.6	27.7
25	6	23.6	25.7	27.8
26	0	23.7	25.8	27.9
26	1	23.8	25.9	28.0
26	2	23.9	26.0	28.1
26	3	24.0	26.1	28.2
26	4	24.1	26.2	28.3
26	5	24.2	26.3	28.4
26	6	24.3	26.4	28.5
27	0	24.4	26.5	28.6
27	1	24.5	26.6	28.7
27	2	24.7	26.7	28.8
27	3	24.8	26.8	28.9
27	4	24.9	26.9	29.0
27	5	25.0	27.0	29.1
27	6	25.1	27.1	29.2
28	0	25.2	27.2	29.3
28	1	25.3	27.3	29.4
28	2	25.4	27.5	29.5
28	3	25.5	27.6	29.6
28	4	25.6	27.7	29.7
28	5	25.7	27.8	29.8
28	6	25.8	27.9	30.0
29	0	25.9	28.0	30.1
29	1	26.0	28.1	30.2
29	2	26.1	28.2	30.3
29	3	26.3	28.3	30.4
29	4	26.4	28.4	30.5
29	5	26.5	28.5	30.6
29	6	26.6	28.7	30.7
30	0	26.7	28.8	30.8
30	1	26.8	28.9	31.0
30	2	26.9	29.0	31.1
30	3	27.0	29.1	31.2
30	4	27.2	29.2	31.3
30	5	27.3	29.3	31.4
30	6	27.4	29.5	31.5
31	0	27.5	29.6	31.6
31	1	27.6	29.7	31.8
31	2	27.7	29.8	31.9
31	3	27.9	29.9	32.0
31	4	28.0	30.1	32.1
31	5	28.1	30.2	32.2
31	6	28.2	30.3	32.4
32	0	28.3	30.4	32.5
32	1	28.5	30.5	32.6
32	2	28.6	30.7	32.7
32	3	28.7	30.8	32.8
32	4	28.8	30.9	33.0
32	5	29.0	31.0	33.1
32	6	29.1	31.1	33.2
33	0	29.2	31.3	33.3
33	1	29.3	31.4	33.5
33	2	29.4	31.5	33.6
33	3	29.6	31.6	33.7
33	4	29.7	31.8	33.8
33	5	29.8	31.9	34.0
33	6	30.0	32.0	34.1
34	0	30.1	32.2	34.2
34	1	30.2	32.3	34.4
34	2	30.3	32.4	34.5
34	3	30.5	32.5	34.6
34	4	30.6	32.7	34.7
34	5	30.7	32.8	34.9
34	6	30.9	32.9	35.0
35	0	31.0	33.1	35.1
35	1	31.1	33.2	35.3
35	2	31.3	33.3	35.4
35	3	31.4	33.5	35.5
35	4	31.5	33.6	35.7
35	5	31.7	33.7	35.8
35	6	31.8	33.9	35.9
36	0	31.9	34.0	36.1
36	1	32.1	34.1	36.2
36	2	32.2	34.3	36.3
36	3	32.3	34.4	36.5
36	4	32.5	34.5	36.6
36	5	32.6	34.7	36.8
36	6	32.8	34.8	36.9
37	0	32.9	35.0	37.0
37	1	33.0	35.1	37.2
37	2	33.2	35.2	37.3
37	3	33.3	35.4	37.5
37	4	33.5	35.5	37.6
37	5	33.6	35.7	37.7
37	6	33.7	35.8	37.9
38	0	33.9	36.0	38.0
38	1	34.0	36.1	38.2
38	2	34.2	36.2	38.3
38	3	34.3	36.4	38.5
38	4	34.5	36.5	38.6
38	5	34.6	36.7	38.7
38	6	34.8	36.8	38.9
39	0	34.9	37.0	39.0
39	1	35.0	37.1	39.2
39	2	35.2	37.3	39.3
39	3	35.3	37.4	39.5
39	4	35.5	37.6	39.6
39	5	35.6	37.7	39.8
39	6	35.8	37.9	39.9
40	0	35.9	38.0	40.1
40	1	36.1	38.2	40.2
40	2	36.2	38.3	40.4
40	3	36.4	38.5	40.5
40	4	36.6	38.6	40.7
40	5	36.7	38.8	40.8
40	6	36.9	38.9	41.0
41	0	37.0	39.1	41.2
41	1	37.2	39.2	41.3
41	2	37.3	39.4	41.5
41	3	37.5	39.5	41.6
41	4	37.6	39.7	41.8
41	5	37.8	39.9	41.9
41	6	37.9	40.0	42.1
42	0	38.1	40.2	42.2

Renal Length, Hansmann

Hansmann M, Hackelöer B-J, Staudach A. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, 1985.

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
20	0	21.0	28.0	36.0	24	1	24.0	31.0	38.1	28	2	26.3	33.3	40.3	32	3	29.0	36.0	43.0	36	4	31.6	38.6	45.6
20	1	21.1	28.1	36.0	24	2	24.0	31.0	38.3	28	3	26.4	33.4	40.4	32	4	29.0	36.0	43.0	36	5	31.7	38.7	45.7
20	2	21.3	28.3	36.0	24	3	24.0	31.0	38.4	28	4	26.6	33.6	40.6	32	5	29.0	36.0	43.0	36	6	31.9	38.9	45.9
20	3	21.4	28.4	36.0	24	4	24.0	31.0	38.6	28	5	26.7	33.7	40.7	32	6	29.0	36.0	43.0	37	0	32.0	39.0	46.0
20	4	21.6	28.6	36.0	24	5	24.0	31.0	38.7	28	6	26.9	33.9	40.9	33	0	29.0	36.0	43.0	37	1	32.0	39.0	46.1
20	5	21.7	28.7	36.0	24	6	24.0	31.0	38.9	29	0	27.0	34.0	41.0	33	1	29.1	36.1	43.1	37	2	32.0	39.0	46.3
20	6	21.9	28.9	36.0	25	0	24.0	31.0	39.0	29	1	27.0	34.0	41.1	33	2	29.3	36.3	43.3	37	3	32.0	39.0	46.4
21	0	22.0	29.0	36.0	25	1	24.1	31.1	39.0	29	2	27.0	34.0	41.3	33	3	29.4	36.4	43.4	37	4	32.0	39.0	46.6
21	1	22.0	29.1	36.1	25	2	24.3	31.3	39.0	29	3	27.0	34.0	41.4	33	4	29.6	36.6	43.6	37	5	32.0	39.0	46.7
21	2	22.0	29.3	36.3	25	3	24.4	31.4	39.0	29	4	27.0	34.0	41.6	33	5	29.7	36.7	43.7	37	6	32.0	39.0	46.9
21	3	22.0	29.4	36.4	25	4	24.6	31.6	39.0	29	5	27.0	34.0	41.7	33	6	29.9	36.9	43.9	38	0	32.0	39.0	47.0
21	4	22.0	29.6	36.6	25	5	24.7	31.7	39.0	29	6	27.0	34.0	41.9	34	0	30.0	37.0	44.0	38	1	32.1	39.1	47.0
21	5	22.0	29.7	36.7	25	6	24.9	31.9	39.0	30	0	27.0	34.0	42.0	34	1	30.0	37.1	44.1	38	2	32.3	39.3	47.0
21	6	22.0	29.9	36.9	26	0	25.0	32.0	39.0	30	1	27.1	34.1	42.0	34	2	30.0	37.3	44.3	38	3	32.4	39.4	47.0
22	0	22.0	30.0	37.0	26	1	25.1	32.1	39.1	30	2	27.3	34.3	42.0	34	3	30.0	37.4	44.4	38	4	32.6	39.6	47.0
22	1	22.1	30.0	37.0	26	2	25.3	32.3	39.3	30	3	27.4	34.4	42.0	34	4	30.0	37.6	44.6	38	5	32.7	39.7	47.0
22	2	22.3	30.0	37.0	26	3	25.4	32.4	39.4	30	4	27.6	34.6	42.0	34	5	30.0	37.7	44.7	38	6	32.9	39.9	47.0
22	3	22.4	30.0	37.0	26	4	25.6	32.6	39.6	30	5	27.7	34.7	42.0	34	6	30.0	37.9	44.9	39	0	33.0	40.0	47.0
22	4	22.6	30.0	37.0	26	5	25.7	32.7	39.7	30	6	27.9	34.9	42.0	35	0	30.0	38.0	45.0	39	1	33.0	40.1	47.1
22	5	22.7	30.0	37.0	26	6	25.9	32.9	39.9	31	0	28.0	35.0	42.0	35	1	30.1	38.0	45.0	39	2	33.0	40.3	47.3
22	6	22.9	30.0	37.0	27	0	26.0	33.0	40.0	31	1	28.1	35.1	42.1	35	2	30.3	38.0	45.0	39	3	33.0	40.4	47.4
23	0	23.0	30.0	37.0	27	1	26.0	33.0	40.0	31	2	28.3	35.3	42.3	35	3	30.4	38.0	45.0	39	4	33.0	40.6	47.6
23	1	23.1	30.1	37.1	27	2	26.0	33.0	40.0	31	3	28.4	35.4	42.4	35	4	30.6	38.0	45.0	39	5	33.0	40.7	47.7
23	2	23.3	30.3	37.3	27	3	26.0	33.0	40.0	31	4	28.6	35.6	42.6	35	5	30.7	38.0	45.0	39	6	33.0	40.9	47.9
23	3	23.4	30.4	37.4	27	4	26.0	33.0	40.0	31	5	28.7	35.7	42.7	35	6	30.9	380	45.0	40	0	33.0	41.0	48.0
23	4	23.6	30.6	37.6	27	5	26.0	33.0	40.0	31	6	28.9	35.9	42.9	36	0	31.0	380	45.0					
23	5	23.7	30.7	37.7	27	6	26.0	33.0	40.0	32	0	29.0	36.0	43.0	36	1	31.1	381	45.1					
23	6	23.9	30.9	37.9	28	0	26.0	33.0	40.0	32	1	29.0	36.0	43.0	36	2	31.3	38.3	45.3					
24	0	24.0	31.0	38.0	28	1	26.1	33.1	40.1	32	2	29.0	36.0	43.0	36	3	31.4	38.4	45.4					

Renal Anterior Posterior, Bertagnoli

Bertagnoli L, Lalatta F, Gallicchio R, Fantuzzi M, Rusca M, Zorzoli A, Deter RL. "Quantitative Characterization of the Growth of the Fetal Kidney." *Journal of Clinical Ultrasound* 11:349, 1983.

RAP(mm) = 8.457278951 + 0.00026630314 * $MA(wks)^3$ 1 Standard Deviation = 1.209 mm   5 & 95%: 1.99 mm

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
22	0	9.3	11.3	13.3	25	5	11.0	13.0	15.0	29	3	13.3	15.2	17.2	33	1	16.2	18.2	20.1	36	6	19.8	21.8	23.8
22	1	9.4	11.3	13.3	25	6	11.1	13.1	15.1	29	4	13.4	15.3	17.3	33	2	16.3	18.3	20.3	37	0	20.0	21.9	23.9
22	2	9.4	11.4	13.4	26	0	11.1	13.1	15.1	29	5	13.5	15.4	17.4	33	3	16.4	18.4	20.4	37	1	20.1	22.1	24.1
22	3	9.5	11.5	13.5	26	1	11.2	13.2	15.2	29	6	13.6	15.5	17.5	33	4	16.5	18.5	20.5	37	2	20.3	22.3	24.3
22	4	9.5	11.5	13.5	26	2	11.3	13.3	15.3	30	0	13.7	15.6	17.6	33	5	16.7	18.7	20.7	37	3	20.4	22.4	24.4
22	5	9.6	11.6	13.6	26	3	11.4	13.4	15.4	30	1	13.8	15.8	17.7	33	6	16.8	18.8	20.8	37	4	20.6	22.6	24.6
22	6	9.6	11.6	13.6	26	4	11.5	13.5	15.4	30	2	13.9	15.9	17.8	34	0	16.9	18.9	20.9	37	5	20.8	22.7	24.7
23	0	9.7	11.7	13.7	26	5	11.5	13.5	15.5	30	3	14.0	16.0	18.0	34	1	17.1	19.1	21.0	37	6	20.9	22.9	24.9
23	1	9.8	11.8	13.7	26	6	11.6	13.6	15.6	30	4	14.1	16.1	18.1	34	2	17.2	19.2	21.2	38	0	21.1	23.1	25.1
23	2	9.8	11.8	13.8	27	0	11.7	13.7	15.7	30	5	14.2	16.2	18.2	34	3	17.3	19.3	21.3	38	1	21.2	23.2	25.2
23	3	9.9	11.9	13.9	27	1	11.8	13.8	15.8	30	6	14.3	16.3	18.3	34	4	17.5	19.5	21.5	38	2	21.4	23.4	25.4
23	4	10.0	11.9	13.9	27	2	11.9	13.9	15.9	31	0	14.4	16.4	18.4	34	5	17.6	19.6	21.6	38	3	21.6	23.6	25.6
23	5	10.0	12.0	14.0	27	3	12.0	14.0	15.9	31	1	14.5	16.5	18.5	34	6	17.7	19.7	21.7	38	4	21.7	23.7	25.7
23	6	10.1	12.1	14.1	27	4	12.0	14.0	16.0	31	2	14.6	16.6	18.6	35	0	17.9	19.9	21.9	38	5	21.9	23.9	25.9
24	0	10.1	12.1	14.1	27	5	12.1	14.1	16.1	31	3	14.7	16.7	18.7	35	1	18.0	20.0	22.0	38	6	22.1	24.1	26.1
24	1	10.2	12.2	14.2	27	6	12.2	14.2	16.2	31	4	14.8	16.8	18.8	35	2	18.2	20.2	22.1	39	0	22.3	24.3	26.2
24	2	10.3	12.3	14.3	28	0	12.3	14.3	16.3	31	5	15.0	17.0	18.9	35	3	18.3	20.3	22.3	39	1	22.4	24.4	26.4
24	3	10.3	12.3	14.3	28	1	12.4	14.4	16.4	31	6	15.1	17.1	19.1	35	4	18.5	20.4	22.4	39	2	22.6	24.6	26.6
24	4	10.4	12.4	14.4	28	2	12.5	14.5	16.5	32	0	15.2	17.2	19.2	35	5	18.6	20.6	22.6	39	3	22.8	24.8	26.8
24	5	10.5	12.5	14.5	28	3	12.6	14.6	16.6	32	1	15.3	17.3	19.3	35	6	18.7	20.7	22.7	39	4	23.0	25.0	26.9
24	6	10.6	12.5	14.5	28	4	12.7	14.7	16.7	32	2	15.4	17.4	19.4	36	0	18.9	20.9	22.9	39	5	23.1	25.1	27.1
25	0	10.6	12.6	14.6	28	5	12.8	14.8	16.8	32	3	15.5	17.5	19.5	36	1	19.0	21.0	23.0	39	6	23.3	25.3	27.3
25	1	10.7	12.7	14.7	28	6	12.9	14.9	16.8	32	4	15.7	17.7	19.6	36	2	19.2	21.2	23.2	40	0	23.5	25.5	27.5
25	2	10.8	12.8	14.8	29	0	13.0	15.0	16.9	32	5	15.8	17.8	19.8	36	3	19.3	21.3	23.3					
25	3	10.8	12.8	14.8	29	1	13.1	15.0	17.0	32	6	15.9	17.9	19.9	36	4	19.5	21.5	23.5					
25	4	10.9	12.9	14.9	29	2	13.2	15.1	17.1	33	0	16.0	18.0	20.0	36	5	19.6	21.6	23.6					

Renal Anterior Posterior, Hansmann

Hansmann M, Hackelöer B-J, Staudach A. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, 1985.

Wk	Day	5%	Mean	95%
20	0	11.0	15.0	19.0
20	1	11.0	15.0	19.0
20	2	11.0	15.0	19.0
20	3	11.0	15.0	19.0
20	4	11.0	15.0	19.0
20	5	11.0	15.0	19.0
20	6	11.0	15.0	19.0
21	0	11.0	15.0	19.0
21	1	11.1	15.1	19.1
21	2	11.3	15.3	19.3
21	3	11.4	15.4	19.4
21	4	11.6	15.6	19.6
21	5	11.7	15.7	19.7
21	6	11.9	15.9	19.9
22	0	12.0	16.0	20.0
22	1	12.0	16.0	20.0
22	2	12.0	16.0	20.0
22	3	12.0	16.0	20.0
22	4	12.0	16.0	20.0
22	5	12.0	16.0	20.0
22	6	12.0	16.0	20.0
23	0	12.0	16.0	20.0
23	1	12.1	16.1	20.1
23	2	12.3	16.3	20.3
23	3	12.4	16.4	20.4
23	4	12.6	16.6	20.6
23	5	12.7	16.7	20.7
23	6	12.9	16.9	20.9
24	0	13.0	17.0	21.0
24	1	13.0	17.0	21.0
24	2	13.0	17.0	21.0
24	3	13.0	17.0	21.0
24	4	13.0	17.0	21.0
24	5	13.0	17.0	21.0
24	6	13.0	17.0	21.0
25	0	13.0	17.0	21.0
25	1	13.1	17.1	21.1
25	2	13.3	17.3	21.3
25	3	13.4	17.4	21.4
25	4	13.6	17.6	21.6
25	5	13.7	17.7	21.7
25	6	13.9	17.9	21.9
26	0	14.0	18.0	22.0
26	1	14.0	18.0	22.0
26	2	14.0	18.0	22.0
26	3	14.0	18.0	22.0
26	4	14.0	18.0	22.0
26	5	14.0	18.0	22.0
26	6	14.0	18.0	22.0
27	0	14.0	18.0	22.0
27	1	14.0	18.0	22.0
27	2	14.0	18.0	22.0
27	3	14.0	18.0	22.0
27	4	14.0	18.0	22.0
27	5	14.0	18.0	22.0
27	6	14.0	18.0	22.0
28	0	14.0	18.0	22.0
28	1	14.1	18.1	22.1
28	2	14.3	18.3	22.3
28	3	14.4	18.4	22.4
28	4	14.6	18.6	22.6
28	5	14.7	18.7	22.7
28	6	14.9	18.9	22.9
29	0	15.0	19.0	23.0
29	1	15.0	19.0	23.0
29	2	15.0	19.0	23.0
29	3	15.0	19.0	23.0
29	4	15.0	19.0	23.0
29	5	15.0	19.0	23.0
29	6	15.0	19.0	23.0
30	0	15.0	19.0	23.0
30	1	15.1	19.1	23.1
30	2	15.3	19.3	23.3
30	3	15.4	19.4	23.4
30	4	15.6	19.6	23.6
30	5	15.7	19.7	23.7
30	6	15.9	19.9	23.9
31	0	16.0	20.0	24.0
31	1	16.0	20.0	24.0
31	2	16.0	20.0	24.0
31	3	16.0	20.0	24.0
31	4	16.0	20.0	24.0
31	5	16.0	20.0	24.0
31	6	16.0	20.0	24.0
32	0	16.0	20.0	24.0
32	1	16.1	20.1	24.1
32	2	16.3	20.3	24.3
32	3	16.4	20.4	24.4
32	4	16.6	20.6	24.6
32	5	16.7	20.7	24.7
32	6	16.9	20.9	24.9
33	0	17.0	21.0	25.0
33	1	17.0	21.0	25.0
33	2	17.0	21.0	25.0
33	3	17.0	21.0	25.0
33	4	17.0	21.0	25.0
33	5	17.0	21.0	25.0
33	6	17.0	21.0	25.0
34	0	17.0	21.0	25.0
34	1	17.0	21.0	25.0
34	2	17.0	21.0	25.0
34	3	17.0	21.0	25.0
34	4	17.0	21.0	25.0
34	5	17.0	21.0	25.0
34	6	17.0	21.0	25.0
35	0	17.0	21.0	25.0
35	1	17.1	21.1	25.1
35	2	17.3	21.3	25.3
35	3	17.4	21.4	25.4
35	4	17.6	21.6	25.6
35	5	17.7	21.7	25.7
35	6	17.9	21.9	25.9
36	0	18.0	22.0	26.0
36	1	18.0	22.0	26.0
36	2	18.0	22.0	26.0
36	3	18.0	22.0	26.0
36	4	18.0	22.0	26.0
36	5	18.0	22.0	26.0
36	6	18.0	22.0	26.0
37	0	18.0	22.0	26.0
37	1	18.1	22.1	26.1
37	2	18.3	22.3	26.3
37	3	18.4	22.4	26.4
37	4	18.6	22.6	26.6
37	5	18.7	22.7	26.7
37	6	18.9	22.9	26.9
38	0	19.0	23.0	27.0
38	1	19.0	23.0	27.0
38	2	19.0	23.0	27.0
38	3	19.0	23.0	27.0
38	4	19.0	23.0	27.0
38	5	19.0	23.0	27.0
38	6	19.0	23.0	27.0
39	0	19.0	23.0	27.0
39	1	19.0	23.0	27.0
39	2	19.0	23.0	27.0
39	3	19.0	23.0	27.0
39	4	19.0	23.0	27.0
39	5	19.0	23.0	27.0
39	6	19.0	23.0	27.0
40	0	19.0	23.0	27.0

Estimated Fetal Weight (EFW) for Growth Analysis Graphs

EFW, Hadlock

Hadlock FP, Harrist RB, Martinez-Poyer J. "In Utero Analysis of Fetal Growth: A Sonographic Weight Standard." *Radiology* 181:129, 1991.

LN EFW(grams) = 0.578 + 0.332 MA(wk) - 0.00354 * MA^2(wk)
±1 Standard Deviation = 0.12
5 & 95%: ± (0.2089 * EFW)

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
10	0	27	35	42	16	2	123	155	188	22	4	417	528	638	28	6	1071	1354	1637	35	1	2078	2627	3175
10	1	28	36	43	16	3	127	160	194	22	5	428	541	654	29	0	1091	1379	1667	35	2	2103	2658	3213
10	2	29	37	45	16	4	131	165	200	22	6	438	554	670	29	1	1110	1404	1697	35	3	2127	2689	3251
10	3	31	39	47	16	5	135	170	206	23	0	449	568	686	29	2	1131	1429	1728	35	4	2152	2720	3288
10	4	32	40	49	16	6	139	176	212	23	1	460	581	703	29	3	1151	1455	1758	35	5	2177	2751	3326
10	5	33	42	50	17	0	143	181	219	23	2	471	595	720	29	4	1171	1480	1790	35	6	2201	2782	3364
10	6	34	43	52	17	1	148	187	226	23	3	482	610	737	29	5	1192	1506	1821	36	0	2226	2813	3401
11	0	35	45	54	17	2	152	192	232	23	4	494	624	755	29	6	1213	1533	1853	36	1	2250	2844	3439
11	1	37	46	56	17	3	157	198	240	23	5	506	639	773	30	0	1234	1559	1885	36	2	2275	2875	3476
11	2	38	48	58	17	4	161	204	247	23	6	518	654	791	30	1	1255	1586	1917	36	3	2299	2906	3513
11	3	39	50	60	17	5	166	210	254	24	0	530	670	810	30	2	1276	1613	1950	36	4	2323	2937	3550
11	4	41	52	63	17	6	171	217	262	24	1	542	685	829	30	3	1298	1640	1983	36	5	2348	2967	3587
11	5	42	54	65	18	0	176	223	270	24	2	555	701	848	30	4	1319	1668	2016	36	6	2372	2998	3624
11	6	44	56	67	18	1	182	230	278	24	3	568	717	867	30	5	1341	1695	2049	37	0	2396	3028	3661
12	0	46	58	70	18	2	187	236	286	24	4	581	734	887	30	6	1363	1723	2083	37	1	2420	3058	3697
12	1	47	60	72	18	3	192	243	294	24	5	594	751	907	31	0	1385	1751	2117	37	2	2443	3089	3734
12	2	49	62	75	18	4	198	250	303	24	6	607	768	928	31	1	1408	1779	2151	37	3	2467	3118	3770
12	3	51	64	77	18	5	204	258	311	25	0	621	785	949	31	2	1430	1808	2186	37	4	2491	3148	3806
12	4	52	66	80	18	6	210	265	320	25	1	635	802	970	31	3	1453	1837	2220	37	5	2514	3178	3842
12	5	54	69	83	19	0	216	273	330	25	2	649	820	991	31	4	1476	1865	2255	37	6	2537	3207	3877
12	6	56	71	86	19	1	222	280	339	25	3	663	838	1013	31	5	1499	1894	2290	38	0	2560	3236	3913
13	0	58	73	89	19	2	228	288	349	25	4	678	857	1035	31	6	1522	1924	2325	38	1	2583	3265	3948
13	1	60	76	92	19	3	235	296	358	25	5	692	875	1058	32	0	1545	1953	2361	38	2	2606	3294	3982
13	2	62	79	95	19	4	241	305	369	25	6	707	894	1081	32	1	1568	1982	2396	38	3	2629	3323	4017
13	3	64	81	98	19	5	248	313	379	26	0	722	913	1104	32	2	1592	2012	2432	38	4	2651	3351	4051
13	4	67	84	102	19	6	255	322	389	26	1	738	933	1127	32	3	1615	2042	2468	38	5	2673	3379	4085
13	5	69	87	105	20	0	262	331	400	26	2	753	952	1151	32	4	1639	2072	2505	38	6	2695	3407	4119
13	6	71	90	109	20	1	269	340	411	26	3	769	972	1175	32	5	1663	2102	2541	39	0	2717	3435	4152
14	0	74	93	112	20	2	276	349	422	26	4	785	993	1200	32	6	1687	2132	2577	39	1	2739	3462	4185
14	1	76	96	116	20	3	284	359	434	26	5	801	1013	1225	33	0	1711	2162	2614	39	2	2760	3489	4218
14	2	79	99	120	20	4	292	369	446	26	6	818	1034	1250	33	1	1735	2193	2651	39	3	2781	3516	4250
14	3	81	103	124	20	5	299	378	458	27	0	835	1055	1275	33	2	1759	2223	2688	39	4	2802	3542	4282
14	4	84	106	128	20	6	307	389	470	27	1	852	1076	1301	33	3	1783	2254	2725	39	5	2823	3568	4313
14	5	87	110	132	21	0	316	399	482	27	2	869	1098	1327	33	4	1807	2285	2762	39	6	2843	3594	4345
14	6	90	113	137	21	1	324	410	495	27	3	886	1120	1354	33	5	1832	2316	2799	40	0	2863	3619	4375
15	0	92	117	141	21	2	332	420	508	27	4	904	1142	1381	33	6	1856	2346	2837	40	1	2883	3644	4406
15	1	96	121	146	21	3	341	431	521	27	5	921	1165	1408	34	0	1881	2377	2874	40	2	2902	3669	4435
15	2	99	125	151	21	4	350	443	535	27	6	939	1187	1435	34	1	1905	2408	2912	40	3	2922	3693	4465
15	3	102	129	156	21	5	359	454	549	28	0	957	1210	1463	34	2	1930	2440	2949	40	4	2941	3717	4494
15	4	105	133	161	21	6	368	466	563	28	1	976	1234	1491	34	3	1955	2471	2987	40	5	2959	3741	4522
15	5	108	137	166	22	0	378	478	577	28	2	994	1257	1520	34	4	1979	2502	3024	40	6	2978	3764	4550
15	6	112	142	171	22	1	387	490	592	28	3	1013	1281	1548	34	5	2004	2533	3062	41	0	2996	3787	4578
16	0	116	146	177	22	2	397	502	607	28	4	1032	1305	1578	34	6	2029	2564	3100					
16	1	119	151	182	22	3	407	515	622	28	5	1052	1329	1607	35	0	2053	2595	3138					

EFW, Jeanty

(using Shepard formula for weight determination)

Jeanty P, Cantraine F, Romero R, Cousaert E, Hobbins JC. "A Longitudinal Study of Fetal Weight Growth." *Journal of Ultrasound in Medicine* 3:321, 1984.

5 & 95%: 1.6 S.D.

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
9	0	44	45	46	15	2	104	131	159	21	4	361	507	653	27	6	884	1267	1649	34	1	1660	2396	3131
9	1	44	45	47	15	3	107	136	165	21	5	370	520	670	28	0	899	1288	1677	34	2	1679	2423	3167
9	2	45	46	47	15	4	110	141	172	21	6	378	532	686	28	1	915	1311	1707	34	3	1697	2450	3202
9	3	45	46	48	15	5	113	146	178	22	0	387	545	703	28	2	930	1334	1737	34	4	1716	2476	3237
9	4	45	47	48	15	6	117	150	184	22	1	397	559	721	28	3	946	1357	1767	34	5	1734	2503	3272
9	5	45	47	49	16	0	120	155	190	22	2	407	573	740	28	4	962	1379	1797	34	6	1753	2530	3308
9	6	46	48	49	16	1	124	161	198	22	3	417	587	758	28	5	978	1402	1827	35	0	1771	2557	3343
10	0	46	48	50	16	2	128	167	206	22	4	426	602	777	28	6	993	1425	1857	35	1	1788	2582	3376
10	1	47	49	51	16	3	132	173	214	22	5	436	616	795	29	0	1009	1448	1887	35	2	1806	2608	3410
10	2	47	50	52	16	4	136	179	222	22	6	446	630	814	29	1	1026	1472	1919	35	3	1823	2633	3443
10	3	48	51	53	16	5	140	185	230	23	0	456	644	832	29	2	1042	1497	1951	35	4	1840	2658	3476
10	4	48	51	55	16	6	144	191	238	23	1	467	660	852	29	3	1059	1521	1983	35	5	1857	2683	3509
10	5	49	52	56	17	0	148	197	246	23	2	477	675	873	29	4	1076	1545	2014	35	6	1875	2709	3543
10	6	49	53	57	17	1	153	204	255	23	3	488	691	893	29	5	1093	1569	2046	36	0	1892	2734	3576
11	0	50	54	58	17	2	158	211	265	23	4	499	706	914	29	6	1109	1594	2078	36	1	1907	2756	3605
11	1	51	55	60	17	3	163	218	274	23	5	510	722	934	30	0	1126	1618	2110	36	2	1923	2779	3635
11	2	52	57	61	17	4	167	226	284	23	6	520	737	955	30	1	1144	1644	2144	36	3	1938	2801	3664
11	3	53	58	63	17	5	172	233	293	24	0	531	753	975	30	2	1161	1669	2177	36	4	1953	2823	3693
11	4	53	59	65	17	6	177	240	303	24	1	543	770	997	30	3	1179	1695	2211	36	5	1968	2845	3722
11	5	54	60	67	18	0	182	247	312	24	2	554	787	1019	30	4	1197	1721	2245	36	6	1984	2868	3752
11	6	55	62	68	18	1	188	256	323	24	3	566	804	1041	30	5	1215	1747	2279	37	0	1999	2890	3781
12	0	56	63	70	18	2	194	264	334	24	4	577	820	1064	30	6	1232	1772	2312	37	1	2011	2908	3805
12	1	57	65	73	18	3	200	273	345	24	5	589	837	1086	31	0	1250	1798	2346	37	2	2023	2926	3829
12	2	59	67	75	18	4	206	281	357	24	6	600	854	1108	31	1	1268	1825	2381	37	3	2035	2944	3853
12	3	60	69	78	18	5	212	290	368	25	0	612	871	1130	31	2	1287	1851	2416	37	4	2046	2962	3878
12	4	62	71	80	18	6	218	298	379	25	1	625	889	1154	31	3	1305	1878	2451	37	5	2058	2980	3902
12	5	63	73	83	19	0	224	307	390	25	2	637	908	1178	31	4	1323	1904	2485	37	6	2070	2998	3926
12	6	65	75	85	19	1	231	317	403	25	3	650	926	1202	31	5	1341	1931	2520	38	0	2082	3016	3950
13	0	66	77	88	19	2	238	327	416	25	4	663	945	1227	31	6	1360	1957	2555	38	1	2089	3028	3967
13	1	68	80	92	19	3	245	337	429	25	5	676	963	1251	32	0	1378	1984	2590	38	2	2096	3040	3983
13	2	70	82	95	19	4	251	347	443	25	6	688	982	1275	32	1	1397	2011	2626	38	3	2103	3052	4000
13	3	72	85	99	19	5	258	357	456	26	0	701	1000	1299	32	2	1415	2039	2662	38	4	2110	3063	4017
13	4	73	88	102	19	6	265	367	469	26	1	715	1020	1325	32	3	1434	2066	2698	38	5	2117	3075	4034
13	5	75	91	106	20	0	272	377	482	26	2	728	1040	1351	32	4	1453	2094	2735	38	6	2124	3087	4050
13	6	77	93	109	20	1	280	388	497	26	3	742	1060	1377	32	5	1472	2121	2771	39	0	2131	3099	4067
14	0	79	96	113	20	2	287	400	512	26	4	756	1079	1403	32	6	1490	2149	2807	39	1	2132	3104	4075
14	1	82	100	118	20	3	295	411	527	26	5	770	1099	1429	33	0	1509	2176	2843	39	2	2132	3108	4084
14	2	84	103	123	20	4	303	422	541	26	6	783	1119	1455	33	1	1528	2204	2879	39	3	2133	3113	4092
14	3	87	107	128	20	5	311	433	556	27	0	797	1139	1481	33	2	1547	2231	2915	39	4	2134	3117	4101
14	4	89	111	132	20	6	318	445	571	27	1	812	1160	1509	33	3	1566	2259	2951	39	5	2135	3122	4109
14	5	92	115	137	21	0	326	456	586	27	2	826	1182	1537	33	4	1585	2286	2988	39	6	2135	3126	4118
14	6	94	118	142	21	1	335	469	603	27	3	841	1203	1565	33	5	1604	2314	3024	40	0	2136	3131	4126
15	0	97	122	147	21	2	343	481	619	27	4	855	1224	1593	33	6	1623	2341	3060					
15	1	100	127	153	21	3	352	494	636	27	5	870	1245	1621	34	0	1642	2369	3096					

EFW, Hansmann

Hansmann M, Hackelöer B-J, Staudach A. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, 1985.

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
9	0	44	45	46	15	2	102	131	161	21	4	357	507	657	27	6	874	1267	1660	34	1	1640	2396	3152
9	1	44	45	46	15	3	106	136	167	21	5	366	520	673	28	0	888	1288	1688	34	2	1658	2423	3188
9	2	45	46	47	15	4	109	141	173	21	6	374	532	690	28	1	904	1311	1718	34	3	1676	2450	3223
9	3	45	46	48	15	5	112	146	179	22	0	383	545	707	28	2	919	1334	1748	34	4	1694	2476	3258
9	4	45	47	48	15	6	116	150	185	22	1	436	559	726	28	3	935	1357	1779	34	5	1713	2503	3294
9	5	45	47	49	16	0	119	155	191	22	2	438	573	744	28	4	950	1379	1809	34	6	1731	2530	3329
9	6	45	48	50	16	1	123	161	199	22	3	441	587	763	28	5	966	1402	1839	35	0	1749	2557	3365
10	0	46	48	50	16	2	127	167	207	22	4	443	602	781	28	6	981	1425	1869	35	1	1766	2582	3398
10	1	46	49	52	16	3	131	173	215	22	5	446	616	800	29	0	996	1448	1900	35	2	1783	2608	3432
10	2	47	50	53	16	4	135	179	223	22	6	448	630	819	29	1	1013	1472	1932	35	3	1800	2633	3465
10	3	47	51	54	16	5	139	185	231	23	0	451	644	837	29	2	1030	1497	1964	35	4	1818	2658	3499
10	4	48	51	55	16	6	143	191	239	23	1	461	660	858	29	3	1046	1521	1996	35	5	1835	2683	3532
10	5	48	52	57	17	0	147	197	247	23	2	472	675	879	29	4	1063	1545	2028	35	6	1852	2709	3566
10	6	49	53	58	17	1	152	204	257	23	3	482	691	899	29	5	1079	1569	2060	36	0	1869	2734	3599
11	0	49	54	59	17	2	156	211	266	23	4	493	706	920	29	6	1096	1594	2092	36	1	1884	2756	3629
11	1	50	55	61	17	3	161	218	276	23	5	503	722	940	30	0	1112	1618	2124	36	2	1899	2779	3658
11	2	51	57	62	17	4	166	226	285	23	6	514	737	961	30	1	1130	1644	2158	36	3	1914	2801	3688
11	3	52	58	64	17	5	171	233	295	24	0	524	753	982	30	2	1147	1669	2192	36	4	1929	2823	3718
11	4	53	59	65	17	6	176	240	304	24	1	536	770	1004	30	3	1165	1695	2226	36	5	1944	2845	3747
11	5	54	60	67	18	0	180	247	314	24	2	547	787	1026	30	4	1182	1721	2260	36	6	1959	2868	3777
11	6	55	62	69	18	1	186	256	325	24	3	559	804	1048	30	5	1200	1747	2294	37	0	1974	2890	3806
12	0	56	63	70	18	2	192	264	336	24	4	570	820	1071	30	6	1217	1772	2327	37	1	1986	2908	3830
12	1	57	65	73	18	3	198	273	347	24	5	582	837	1093	31	0	1235	1798	2361	37	2	1997	2926	3855
12	2	58	67	76	18	4	204	281	359	24	6	593	854	1115	31	1	1253	1825	2397	37	3	2009	2944	3879
12	3	60	69	78	18	5	210	290	370	25	0	605	871	1137	31	2	1271	1851	2432	37	4	2021	2962	3903
12	4	61	71	81	18	6	216	298	381	25	1	617	889	1162	31	3	1289	1878	2467	37	5	2033	2980	3927
12	5	63	73	83	19	0	221	307	393	25	2	630	908	1186	31	4	1307	1904	2502	37	6	2044	2998	3952
12	6	64	75	86	19	1	228	317	406	25	3	642	926	1210	31	5	1325	1931	2537	38	0	2056	3016	3976
13	0	65	77	89	19	2	235	327	419	25	4	655	945	1235	31	6	1343	1957	2572	38	1	2063	3028	3993
13	1	67	80	92	19	3	242	337	432	25	5	667	963	1259	32	0	1361	1984	2607	38	2	2070	3040	4010
13	2	69	82	96	19	4	249	347	445	25	6	680	982	1283	32	1	1379	2011	2644	38	3	2076	3052	4027
13	3	71	85	99	19	5	256	357	458	26	0	692	1000	1308	32	2	1398	2039	2680	38	4	2083	3063	4044
13	4	73	88	103	19	6	262	367	472	26	1	706	1020	1334	32	3	1416	2066	2717	38	5	2090	3075	4061
13	5	74	91	107	20	0	269	377	485	26	2	719	1040	1360	32	4	1435	2094	2753	38	6	2096	3087	4078
13	6	76	93	110	20	1	277	388	500	26	3	733	1060	1386	32	5	1453	2121	2789	39	0	2103	3099	4095
14	0	78	96	114	20	2	285	400	515	26	4	746	1079	1412	32	6	1472	2149	2826	39	1	2104	3104	4103
14	1	80	100	119	20	3	292	411	530	26	5	760	1099	1439	33	0	1490	2176	2862	39	2	2104	3108	4112
14	2	83	103	124	20	4	300	422	544	26	6	773	1119	1465	33	1	1509	2204	2898	39	3	2105	3113	4120
14	3	86	107	129	20	5	307	433	559	27	0	787	1139	1491	33	2	1528	2231	2935	39	4	2106	3117	4129
14	4	88	111	134	20	6	315	445	574	27	1	801	1160	1519	33	3	1546	2259	2971	39	5	2106	3122	4137
14	5	91	115	139	21	0	323	456	589	27	2	816	1182	1547	33	4	1565	2286	3008	39	6	2107	3126	4146
14	6	93	118	143	21	1	331	469	606	27	3	830	1203	1575	33	5	1584	2314	3044	40	0	2108	3131	4154
15	0	96	122	148	21	2	340	481	623	27	4	845	1224	1603	33	6	1603	2341	3080					
15	1	99	127	154	21	3	349	494	640	27	5	859	1245	1632	34	0	1621	2369	3117					

EFW, Yarkoni

Yarkoni S, Reece EA, Holford T, O'Connor TZ, Hobbins JC. "Estimated Fetal Weight in the Evaluation of Growth in Twin Gestations: A Prospective Longitudinal Study." *Obstetrics and Gynecology* 69:636, 1987.

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
16	0	132	154	207	20	3	250	370	607	24	6	524	773	1085	29	2	932	1438	1914	33	5	1567	2169	3149
16	1	138	163	213	20	4	257	386	632	25	0	549	793	1118	29	3	948	1460	1930	33	6	1582	2197	3178
16	2	144	171	219	20	5	263	401	656	25	1	574	813	1151	29	4	963	1481	1945	34	0	1597	2224	3208
16	3	150	180	225	20	6	269	417	681	25	2	598	832	1185	29	5	979	1503	1961	34	1	1612	2253	3226
16	4	155	189	231	21	0	275	432	705	25	3	623	852	1218	29	6	995	1524	1976	34	2	1627	2282	3245
16	5	161	198	237	21	1	281	447	729	25	4	648	872	1252	30	0	1011	1546	1992	34	3	1642	2311	3263
16	6	167	206	243	21	2	288	463	754	25	5	673	892	1285	30	1	1038	1567	2049	34	4	1658	2340	3281
17	0	173	215	249	21	3	294	478	778	25	6	697	911	1319	30	2	1064	1588	2106	34	5	1673	2369	3299
17	1	179	224	255	21	4	300	494	803	26	0	722	931	1352	30	3	1091	1609	2163	34	6	1688	2398	3318
17	2	185	232	261	21	5	306	509	827	26	1	727	953	1382	30	4	1118	1630	2221	35	0	1703	2427	3336
17	3	191	241	267	21	6	313	525	852	26	2	731	976	1412	30	5	1145	1651	2278	35	1	1718	2456	3354
17	4	196	250	273	22	0	319	540	876	26	3	736	998	1442	30	6	1171	1672	2335	35	2	1733	2485	3373
17	5	202	259	279	22	1	323	548	877	26	4	741	1020	1473	31	0	1198	1693	2392	35	3	1748	2514	3391
17	6	208	267	285	22	2	327	557	877	26	5	746	1042	1503	31	1	1225	1714	2449	35	4	1764	2544	3410
18	0	214	276	291	22	3	331	565	878	26	6	750	1065	1533	31	2	1251	1735	2507	35	5	1779	2573	3428
18	1	215	279	308	22	4	335	573	878	27	0	755	1087	1563	31	3	1278	1756	2564	35	6	1794	2602	3447
18	2	217	283	326	22	5	339	581	879	27	1	760	1109	1593	31	4	1305	1777	2621	36	0	1809	2631	3465
18	3	218	286	343	22	6	343	590	879	27	2	765	1132	1623	31	5	1332	1798	2678	36	1	1870	2659	3496
18	4	219	290	360	23	0	347	598	880	27	3	770	1154	1653	31	6	1358	1819	2736	36	2	1932	2686	3526
18	5	220	293	377	23	1	351	606	881	27	4	774	1177	1684	32	0	1385	1840	2793	36	3	1993	2714	3557
18	6	222	297	395	23	2	355	615	881	27	5	779	1199	1714	32	1	1400	1867	2823	36	4	2055	2741	3587
19	0	223	300	412	23	3	359	623	882	27	6	784	1222	1744	32	2	1415	1895	2852	36	5	2116	2769	3618
19	1	224	303	429	23	4	364	631	883	28	0	789	1244	1774	32	3	1430	1922	2882	36	6	2178	2796	3648
19	2	226	307	447	23	5	368	639	884	28	1	805	1266	1790	32	4	1446	1950	2911	37	0	2239	2824	3679
19	3	227	310	464	23	6	372	648	884	28	2	821	1287	1805	32	5	1461	1977	2941	37	1	2300	2852	3710
19	4	228	314	482	24	0	376	656	885	28	3	837	1309	1821	32	6	1476	2005	2970	37	2	2362	2879	3740
19	5	229	317	499	24	1	401	676	918	28	4	852	1330	1836	33	0	1491	2032	3000	37	3	2423	2907	3771
19	6	231	321	517	24	2	425	695	952	28	5	868	1352	1852	33	1	1506	2059	3030	37	4	2485	2934	3802
20	0	232	324	534	24	3	450	715	985	28	6	884	1373	1867	33	2	1521	2087	3059	37	5	2546	2962	3833
20	1	238	339	558	24	4	475	734	1018	29	0	900	1395	1883	33	3	1536	2114	3089	37	6	2608	2989	3863
20	2	244	355	583	24	5	500	754	1051	29	1	916	1417	1899	33	4	1552	2142	3119	38	0	2669	3017	3894

EFW, Tokyo

Masuda H, Shinozuka N, Okai T, Mizuno M. "Diagnosis of the Week of Pregnancy and Prognosis." *Perinatal Care* 8:719-726.

EFW Days	- 1.5SD	mean grams	+ 1.5SD	EFW Days	- 1.5SD	mean grams	+ 1.5SD	EFW Days	- 1.5SD	mean grams	+ 1.5SD	EFW Days	- 1.5SD	mean grams	+ 1.5SD
140	81.0	216.0	397.0	177	537.0	762.0	1,042.0	214	1,113.0	1,527.0	1,969.0	251	1,959.0	2,567.0	3,192.0
141	86.0	232.0	414.0	178	552.0	779.0	1,062.0	215	1,131.0	1,553.0	2,000.0	252	1,986.0	2,595.0	3,223.0
142	92.0	247.0	432.0	179	567.0	795.0	1,082.0	216	1,149.0	1,579.0	2,031.0	253	2,013.0	2,623.0	3,254.0
143	98.0	263.0	449.0	180	582.0	812.0	1,102.0	217	1,167.0	1,605.0	2,062.0	254	2,041.0	2,650.0	3,285.0
144	106.0	278.0	467.0	181	597.0	829.0	1,123.0	218	1,186.0	1,631.0	2,094.0	255	2,068.0	2,677.0	3,315.0
145	114.0	293.0	484.0	182	612.0	846.0	1,143.0	219	1,205.0	1,658.0	2,126.0	256	2,095.0	2,704.0	3,345.0
146	122.0	307.0	501.0	183	626.0	863.0	1,165.0	220	1,224.0	1,684.0	2,158.0	257	2,123.0	2,730.0	3,374.0
147	131.0	322.0	518.0	184	641.0	881.0	1,186.0	221	1,244.0	1,711.0	2,190.0	258	2,150.0	2,756.0	3,402.0
148	141.0	337.0	535.0	185	656.0	899.0	1,208.0	222	1,263.0	1,738.0	2,222.0	259	2,177.0	2,782.0	3,430.0
149	151.0	351.0	551.0	186	671.0	917.0	1,229.0	223	1,283.0	1,766.0	2,255.0	260	2,205.0	2,807.0	3,458.0
150	162.0	366.0	568.0	187	686.0	935.0	1,252.0	224	1,304.0	1,793.0	2,288.0	261	2,232.0	2,832.0	3,485.0
151	173.0	380.0	585.0	188	701.0	953.0	1,274.0	225	1,324.0	1,821.0	2,321.0	262	2,258.0	2,857.0	3,511.0
152	185.0	394.0	602.0	189	715.0	972.0	1,297.0	226	1,345.0	1,849.0	2,354.0	263	2,285.0	2,881.0	3,536.0
153	197.0	409.0	618.0	190	730.0	991.0	1,320.0	227	1,366.0	1,877.0	2,388.0	264	2,311.0	2,905.0	3,561.0
154	209.0	423.0	635.0	191	745.0	1,010.0	1,343.0	228	1,388.0	1,905.0	2,421.0	265	2,337.0	2,928.0	3,584.0
155	222.0	437.0	652.0	192	760.0	1,030.0	1,367.0	229	1,410.0	1,934.0	2,455.0	266	2,363.0	2,950.0	3,607.0
156	235.0	451.0	668.0	193	775.0	1,050.0	1,391.0	230	1,432.0	1,962.0	2,489.0	267	2,388.0	2,972.0	3,630.0
157	248.0	465.0	685.0	194	790.0	1,070.0	1,415.0	231	1,454.0	1,991.0	2,522.0	268	2,413.0	2,993.0	3,651.0
158	261.0	479.0	702.0	195	805.0	1,090.0	1,440.0	232	1,477.0	2,019.0	2,556.0	269	2,437.0	3,014.0	3,671.0
159	275.0	493.0	718.0	196	820.0	1,111.0	1,465.0	233	1,500.0	2,048.0	2,590.0	270	2,461.0	3,034.0	3,690.0
160	289.0	508.0	735.0	197	836.0	1,131.0	1,490.0	234	1,523.0	2,077.0	2,625.0	271	2,484.0	3,053.0	3,708.0
161	303.0	522.0	752.0	198	851.0	1,153.0	1,516.0	235	1,547.0	2,106.0	2,659.0	272	2,506.0	3,072.0	3,726.0
162	317.0	536.0	769.0	199	866.0	1,174.0	1,542.0	236	1,571.0	2,135.0	2,693.0	273	2,528.0	3,090.0	3,742.0
163	331.0	550.0	786.0	200	882.0	1,196.0	1,568.0	237	1,595.0	2,164.0	2,727.0	274	2,549.0	3,107.0	3,757.0
164	345.0	565.0	804.0	201	897.0	1,218.0	1,595.0	238	1,619.0	2,193.0	2,761.0	275	2,569.0	3,123.0	3,770.0
165	360.0	579.0	821.0	202	913.0	1,240.0	1,622.0	239	1,644.0	2,222.0	2,795.0	276	2,589.0	3,138.0	3,783.0
166	374.0	594.0	838.0	203	929.0	1,262.0	1,649.0	240	1,669.0	2,251.0	2,829.0	277	2,607.0	3,153.0	3,794.0
167	389.0	608.0	856.0	204	945.0	1,285.0	1,677.0	241	1,694.0	2,280.0	2,863.0	278	2,625.0	3,166.0	3,803.0
168	404.0	623.0	874.0	205	961.0	1,308.0	1,704.0	242	1,720.0	2,309.0	2,897.0	279	2,641.0	3,179.0	3,812.0
169	418.0	638.0	892.0	206	977.0	1,331.0	1,733.0	243	1,745.0	2,339.0	2,930.0	280	2,656.0	3,190.0	3,819.0
170	433.0	653.0	910.0	207	993.0	1,355.0	1,761.0	244	1,771.0	2,367.0	2,964.0	281	2,670.0	3,201.0	3,824.0
171	448.0	668.0	928.0	208	1,010.0	1,379.0	1,790.0	245	1,798.0	2,396.0	2,997.0	282	2,683.0	3,210.0	3,828.0
172	463.0	684.0	947.0	209	1,026.0	1,403.0	1,819.0	246	1,824.0	2,425.0	3,030.0	283	2,694.0	3,219.0	3,830.0
173	478.0	699.0	965.0	210	1,043.0	1,427.0	1,848.0	247	1,851.0	2,454.0	3,063.0	284	2,704.0	3,226.0	3,831.0
174	493.0	715.0	984.0	211	1,060.0	1,452.0	1,878.0	248	1,877.0	2,482.0	3,096.0	285	2,712.0	3,232.0	3,829.0
175	508.0	730.0	1,003.0	212	1,078.0	1,477.0	1,908.0	249	1,904.0	2,511.0	3,128.0	286	2,719.0	3,237.0	3,826.0
176	522.0	746.0	1,023.0	213	1,095.0	1,502.0	1,938.0	250	1,931.0	2,539.0	3,160.0	287	2,724.0	3,240.0	3,822.0

EFW, Osaka

Aoki M, Yamada M. "Examining Fetal Growth." *Obstetrics and Gynecology* 47:547-556, 1983.

EFW = 1.25647 * BPD^3 + 3.50665 * FTA * FL + 6.3

EFW Day	- 1.5SD	mean grams	+ 1.5SD	EFW Days	- 1.5SD	mean grams	+ 1.5SD	EFW Days	- 1.5SD	mean grams	+ 1.5SD	EFW Days	- 1.5SD	mean grams	+ 1.5SD
112	93.5	137.0	180.5	155	416.5	526.0	635.5	198	1,056.0	1,296.0	1,536.0	241	1,931.5	2,329.0	2,726.5
113	98.5	142.0	185.5	156	429.0	540.0	651.0	199	1,075.0	1,318.0	1,561.0	242	1,952.0	2,354.0	2,756.0
114	103.5	147.0	190.5	157	439.0	553.0	667.0	200	1,094.0	1,340.0	1,586.0	243	1,972.5	2,379.0	2,785.5
115	109.5	153.0	196.5	158	451.0	568.0	685.0	201	1,112.5	1,363.0	1,613.5	244	1,992.0	2,403.0	2,814.0
116	113.0	158.0	203.0	159	462.0	582.0	702.0	202	1,131.5	1,385.0	1,638.5	245	2,014.0	2,428.0	2,842.0
117	119.0	164.0	209.0	160	474.5	596.0	717.5	203	1,150.5	1,407.0	1,663.5	246	2,034.5	2,453.0	2,871.5
118	125.0	170.0	215.0	161	486.5	611.0	735.5	204	1,169.0	1,430.0	1,691.0	247	2,055.0	2,478.0	2,901.0
119	129.5	176.0	222.5	162	498.5	626.0	753.5	205	1,189.0	1,453.0	1,717.0	248	2,074.5	2,502.0	2,929.5
120	135.5	182.0	228.5	163	510.5	641.0	771.5	206	1,209.0	1,476.0	1,743.0	249	2,095.0	2,527.0	2,959.0
121	140.0	188.0	236.0	164	522.5	656.0	789.5	207	1,227.5	1,499.0	1,770.5	250	2,116.0	2,551.0	2,986.0
122	145.5	195.0	244.5	165	535.5	672.0	808.5	208	1,247.5	1,522.0	1,796.5	251	2,136.5	2,576.0	3,015.5
123	152.5	202.0	251.5	166	550.0	688.0	826.0	209	1,267.5	1,545.0	1,822.5	252	2,156.0	2,600.0	3,044.0
124	158.0	209.0	260.0	167	563.0	704.0	845.0	210	1,286.0	1,568.0	1,850.0	253	2,175.5	2,624.0	3,072.5
125	163.5	216.0	268.5	168	576.0	720.0	864.0	211	1,307.0	1,592.0	1,877.0	254	2,195.0	2,648.0	3,101.0
126	170.5	223.0	275.5	169	589.0	736.0	883.0	212	1,327.0	1,615.0	1,903.0	255	2,214.5	2,672.0	3,129.5
127	177.0	231.0	285.0	170	603.0	753.0	903.0	213	1,346.5	1,639.0	1,931.5	256	2,234.0	2,696.0	3,158.0
128	182.5	238.0	293.5	171	617.0	770.0	923.0	214	1,367.5	1,663.0	1,958.5	257	2,253.5	2,720.0	3,186.5
129	189.0	246.0	303.0	172	631.0	787.0	943.0	215	1,387.0	1,687.0	1,987.0	258	2,273.0	2,744.0	3,215.0
130	195.5	254.0	312.5	173	645.0	804.0	963.0	216	1,408.0	1,711.0	2,014.0	259	2,291.5	2,767.0	3,242.5
131	203.0	263.0	323.0	174	660.0	822.0	984.0	217	1,429.0	1,735.0	2,041.0	260	2,311.0	2,791.0	3,271.0
132	209.5	271.0	332.5	175	674.0	839.0	1,004.0	218	1,448.5	1,759.0	2,069.5	261	2,329.5	2,814.0	3,298.5
133	217.0	280.0	343.0	176	689.0	857.0	1,025.0	219	1,469.5	1,783.0	2,096.5	262	2,348.0	2,837.0	3,326.0
134	224.5	289.0	353.5	177	704.0	875.0	1,046.0	220	1,490.0	1,808.0	2,126.0	263	2,366.5	2,860.0	3,353.5
135	232.0	298.0	364.0	178	719.0	893.0	1,067.0	221	1,511.0	1,832.0	2,153.0	264	2,385.0	2,883.0	3,381.0
136	240.5	308.0	375.5	179	735.0	912.0	1,089.0	222	1,531.5	1,857.0	2,182.5	265	2,403.5	2,906.0	3,408.5
137	248.0	317.0	386.0	180	750.0	930.0	1,110.0	223	1,552.5	1,881.0	2,209.5	266	2,419.5	2,928.0	3,436.5
138	255.0	327.0	399.0	181	764.5	949.0	1,133.5	224	1,573.0	1,906.0	2,239.0	267	2,437.0	2,950.0	3,463.0
139	263.5	337.0	410.5	182	780.5	968.0	1,155.5	225	1,594.0	1,930.0	2,266.0	268	2,455.5	2,973.0	3,490.5
140	272.0	347.0	422.0	183	796.5	987.0	1,177.5	226	1,614.5	1,955.0	2,295.5	269	2,473.0	2,995.0	3,517.0
141	281.5	358.0	434.5	184	813.5	1,007.0	1,200.5	227	1,636.5	1,980.0	2,323.5	270	2,488.0	3,016.0	3,544.0
142	288.5	368.0	447.5	185	829.5	1,026.0	1,222.5	228	1,657.0	2,005.0	2,353.0	271	2,505.5	3,038.0	3,570.5
143	298.0	379.0	460.0	186	846.5	1,046.0	1,245.5	229	1,678.0	2,029.0	2,380.0	272	2,522.0	3,059.0	3,596.0
144	306.0	390.0	474.0	187	863.5	1,066.0	1,268.5	230	1,698.5	2,054.0	2,409.5	273	2,537.0	3,080.0	3,623.0
145	315.5	401.0	486.5	188	879.0	1,086.0	1,293.0	231	1,720.5	2,079.0	2,437.5	274	2,553.5	3,101.0	3,648.5
146	326.0	413.0	500.0	189	896.0	1,106.0	1,316.0	232	1,741.0	2,104.0	2,467.0	275	2,567.5	3,121.0	3,674.5
147	335.0	425.0	515.0	190	914.0	1,127.0	1,340.0	233	1,763.0	2,129.0	2,495.0	276	2,584.0	3,142.0	3,700.0
148	344.5	436.0	527.5	191	931.0	1,147.0	1,363.0	234	1,783.5	2,154.0	2,524.5	277	2,598.0	3,162.0	3,726.0
149	354.5	449.0	543.5	192	949.0	1,168.0	1,387.0	235	1,804.0	2,179.0	2,554.0	278	2,613.5	3,182.0	3,750.5
150	363.5	461.0	558.5	193	965.5	1,189.0	1,412.5	236	1,826.0	2,204.0	2,582.0	279	2,626.5	3,201.0	3,775.5
151	375.0	474.0	573.0	194	983.5	1,210.0	1,436.5	237	1,846.5	2,229.0	2,611.5	280	2,639.5	3,220.0	3,800.5
152	384.0	486.0	588.0	195	1,002.5	1,232.0	1,461.5	238	1,868.5	2,254.0	2,639.5				
153	395.5	499.0	602.5	196	1,020.5	1,253.0	1,485.5	239	1,889.0	2,279.0	2,669.0				
154	406.5	513.0	619.5	197	1,038.0	1,275.0	1,512.0	240	1,909.5	2,304.0	2,698.5				

EFW, JSUM

Japan Society of Ultrasonics in Medicine. "Standardization of Fetometry and Official Announcement of Diagnostic Guidelines." *J. Med. Ultrasonics* 28:844-872, 2001.

EFW Days	- 1.5SD	mean grams	+ 1.5SD	EFW Days	- 1.5SD	mean grams	+ 1.5SD	EFW Days	- 1.5SD	mean grams	+ 1.5SD	EFW Days	- 1.5SD	mean grams	+ 1.5SD
126	141.3	187.0	232.0	167	499.1	645.7	792.2	208	1,152.8	1,425.1	1,697.3	249	2,009.3	2,432.4	2,854.8
127	147.7	195.6	242.8	168	510.8	660.0	809.3	209	1,171.9	1,447.6	1,723.1	250	2,030.2	2,457.3	2,883.6
128	154.1	204.1	253.6	169	523.8	675.9	827.9	210	1,191.0	1,470.0	1,749.0	251	2,051.1	2,482.1	2,912.4
129	160.5	212.7	264.5	170	536.9	691.7	846.5	211	1,211.1	1,493.6	1,776.0	252	2,072.0	2,507.0	2,941.3
130	167.0	221.3	275.3	171	550.0	707.6	865.2	212	1,231.3	1,517.1	1,803.0	253	2,092.2	2,531.1	2,969.6
131	173.4	229.9	286.1	172	563.0	723.4	883.8	213	1,251.4	1,540.7	1,830.0	254	2,112.4	2,555.3	2,997.9
132	179.8	238.4	296.9	173	576.1	739.3	902.5	214	1,271.6	1,564.3	1,857.0	255	2,132.5	2,579.4	3,026.2
133	186.3	247.0	307.8	174	589.2	755.1	921.1	215	1,291.7	1,587.9	1,884.0	256	2,152.7	2,603.6	3,054.5
134	193.4	256.4	319.5	175	602.3	771.0	939.8	216	1,311.9	1,611.4	1,911.0	257	2,172.9	2,627.7	3,082.9
135	200.6	265.9	331.3	176	616.5	788.3	959.9	217	1,332.0	1,635.0	1,938.0	258	2,193.1	2,651.9	3,111.2
136	207.8	275.3	343.1	177	630.8	805.6	980.1	218	1,352.8	1,659.3	1,965.9	259	2,213.3	2,676.0	3,139.5
137	215.0	284.7	354.9	178	645.1	822.9	1,000.3	219	1,373.5	1,683.6	1,993.9	260	2,232.1	2,699.1	3,166.7
138	222.1	294.1	366.7	179	659.4	840.1	1,020.5	220	1,394.3	1,707.9	2,021.8	261	2,251.0	2,722.3	3,193.9
139	229.3	303.6	378.5	180	673.7	857.4	1,040.6	221	1,415.0	1,732.1	2,049.7	262	2,269.8	2,745.4	3,221.1
140	236.5	313.0	390.3	181	688.0	874.7	1,060.8	222	1,435.8	1,756.4	2,077.6	263	2,288.7	2,768.6	3,248.4
141	244.6	323.6	403.2	182	702.3	892.0	1,081.0	223	1,456.5	1,780.7	2,105.6	264	2,307.5	2,791.7	3,275.6
142	252.7	334.1	416.1	183	718.0	910.7	1,102.8	224	1,477.3	1,805.0	2,133.5	265	2,326.4	2,814.9	3,302.8
143	260.8	344.7	429.0	184	733.7	929.4	1,124.6	225	1,498.5	1,830.0	2,162.0	266	2,345.3	2,838.0	3,330.0
144	268.9	355.3	442.0	185	749.4	948.1	1,146.5	226	1,519.8	1,855.0	2,190.6	267	2,362.5	2,859.6	3,355.9
145	277.0	365.9	454.9	186	765.1	966.9	1,168.3	227	1,541.0	1,880.0	2,219.1	268	2,379.8	2,881.1	3,381.7
146	285.1	376.4	467.8	187	780.8	985.6	1,190.1	228	1,562.3	1,905.0	2,247.6	269	2,397.1	2,902.7	3,407.6
147	293.3	387.0	480.8	188	796.5	1,004.3	1,211.9	229	1,583.5	1,930.0	2,276.2	270	2,414.4	2,924.3	3,433.4
148	302.4	398.7	494.9	189	812.3	1,023.0	1,233.8	230	1,604.8	1,955.0	2,304.7	271	2,431.7	2,945.9	3,459.3
149	311.5	410.4	509.1	190	829.1	1,043.0	1,257.0	231	1,626.0	1,980.0	2,333.3	272	2,449.0	2,967.4	3,485.1
150	320.7	422.1	523.3	191	846.0	1,063.0	1,280.2	232	1,647.5	2,005.1	2,362.3	273	2,466.3	2,989.0	3,511.0
151	329.8	433.9	537.5	192	862.9	1,083.0	1,303.4	233	1,669.0	2,030.3	2,391.3	274	2,481.4	3,008.4	3,534.8
152	339.0	445.6	551.6	193	879.8	1,103.0	1,326.6	234	1,690.5	2,055.4	2,420.3	275	2,496.5	3,027.9	3,558.6
153	348.1	457.3	565.8	194	896.7	1,123.0	1,349.8	235	1,712.0	2,080.6	2,449.3	276	2,511.7	3,047.3	3,582.5
154	357.3	469.0	580.0	195	913.6	1,143.0	1,373.0	236	1,733.5	2,105.7	2,478.3	277	2,526.8	3,066.7	3,606.3
155	367.6	482.0	595.7	196	930.5	1,163.0	1,396.3	237	1,755.0	2,130.9	2,507.3	278	2,542.0	3,086.1	3,630.1
156	377.9	495.0	611.4	197	948.6	1,184.4	1,420.8	238	1,776.5	2,156.0	2,536.3	279	2,557.1	3,105.6	3,653.9
157	388.2	508.0	627.0	198	966.7	1,205.9	1,445.3	239	1,797.8	2,181.3	2,565.3	280	2,572.3	3,125.0	3,677.8
158	398.5	521.0	642.7	199	984.8	1,227.3	1,469.9	240	1,819.1	2,206.6	2,594.3	281	2,584.8	3,142.0	3,699.3
159	408.9	534.0	658.4	200	1,002.9	1,248.7	1,494.4	241	1,840.5	2,231.9	2,623.4	282	2,597.3	3,159.0	3,720.8
160	419.2	547.0	674.1	201	1,021.0	1,270.1	1,518.9	242	1,861.8	2,257.1	2,652.4	283	2,609.8	3,176.0	3,742.3
161	429.5	560.0	689.8	202	1,039.1	1,291.6	1,543.5	243	1,883.1	2,282.4	2,681.4	284	2,622.3	3,193.0	3,763.8
162	441.1	574.3	706.8	203	1,057.3	1,313.0	1,568.0	244	1,904.4	2,307.7	2,710.5	285	2,634.8	3,210.0	3,785.3
163	452.7	588.6	723.9	204	1,076.4	1,335.4	1,593.9	245	1,925.8	2,333.0	2,739.5	286	2,647.3	3,227.0	3,806.8
164	464.3	602.9	741.0	205	1,095.5	1,357.9	1,619.7	246	1,946.6	2,357.9	2,768.3	287	2,659.8	3,244.0	3,828.3
165	475.9	617.1	758.0	206	1,114.6	1,380.3	1,645.6	247	1,967.5	2,382.7	2,797.1				
166	487.5	631.4	775.1	207	1,133.7	1,402.7	1,671.4	248	1,988.4	2,407.6	2,826.0				

Ratios and Indices for Growth Analysis Graphs

AFI Amniotic Fluid Index, Moore

Moore TR, Cayle JE. "The amniotic fluid index in normal human pregnancy." *American Journal of Obstetrics and Gynecology* 162:1168, 1990.

Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%	Wk	Day	5%	Mean	95%
16	0	79.0	121.0	185.0	21	2	95.6	143.6	214.6	26	4	95.9	146.4	224.7	31	6	86.3	144.0	241.4	37	1	74.7	134.6	243.3
16	1	79.6	121.9	186.3	21	3	95.9	143.9	214.9	26	5	95.6	146.3	225.1	32	0	86.0	1440	242.0	37	2	74.4	134.1	242.6
16	2	80.1	122.7	187.6	21	4	96.1	144.1	215.1	26	6	95.3	146.1	225.6	32	1	85.6	143.9	242.4	37	3	74.1	133.7	241.9
16	3	80.7	123.6	188.9	21	5	96.4	144.4	215.4	27	0	95.0	146.0	226.0	32	2	85.1	143.7	242.9	37	4	73.9	133.3	241.1
16	4	81.3	124.4	190.1	21	6	96.7	144.7	215.7	27	1	94.9	146.0	226.3	32	3	84.7	143.6	243.3	37	5	73.6	132.9	240.4
16	5	81.9	125.3	191.4	22	0	97.0	145.0	216.0	27	2	94.7	146.0	226.6	32	4	84.3	143.4	243.7	37	6	73.3	132.4	239.7
16	6	82.4	126.1	192.7	22	1	97.1	145.1	216.3	27	3	94.6	146.0	226.9	32	5	83.9	143.3	244.1	38	0	73.0	132.0	239.0
17	0	83.0	127.0	194.0	22	2	97.3	145.3	216.6	27	4	94.4	146.0	227.1	32	6	83.4	143.1	244.6	38	1	72.9	131.3	237.1
17	1	83.6	127.9	195.1	22	3	97.4	145.4	216.9	27	5	94.3	146.0	227.4	33	0	83.0	143.0	245.0	38	2	72.7	130.6	235.3
17	2	84.1	128.7	196.3	22	4	97.6	145.6	217.1	27	6	94.1	146.0	227.7	33	1	82.7	142.9	245.4	38	3	72.6	129.9	233.4
17	3	84.7	129.6	197.4	22	5	97.7	145.7	217.4	28	0	94.0	146.0	228.0	33	2	82.4	142.7	245.9	38	4	72.4	129.1	231.6
17	4	85.3	130.4	198.6	22	6	97.9	145.9	217.7	28	1	93.7	145.9	228.4	33	3	82.1	142.6	246.3	38	5	72.3	128.4	229.7
17	5	85.9	131.3	199.7	23	0	98.0	146.0	218.0	28	2	93.4	145.7	228.9	33	4	81.9	142.4	246.7	38	6	72.1	127.7	227.9
17	6	86.4	132.1	200.9	23	1	98.0	146.1	218.1	28	3	93.1	145.6	229.3	33	5	81.6	1423	2471	39	0	72.0	127.0	226.0
18	0	87.0	133.0	202.0	23	2	98.0	146.3	218.3	28	4	92.9	145.4	229.7	33	6	81.3	1421	2476	39	1	71.9	126.4	224.3
18	1	87.4	133.6	202.7	23	3	98.0	146.4	218.4	28	5	92.6	145.3	230.1	34	0	81.0	142.0	248.0	39	2	71.7	125.9	222.6
18	2	87.9	134.1	203.4	23	4	98.0	146.6	218.6	28	6	92.3	145.1	230.6	34	1	80.7	141.7	248.1	39	3	71.6	125.3	220.9
18	3	88.3	134.7	204.1	23	5	98.0	146.7	218.7	29	0	92.0	145.0	231.0	34	2	80.4	141.4	248.3	39	4	71.4	124.7	219.1
18	4	88.7	135.3	204.9	23	6	98.0	146.9	218.9	29	1	91.7	145.0	231.4	34	3	80.1	141.1	248.4	39	5	71.3	124.1	217.4
18	5	89.1	135.9	205.6	24	0	98.0	147.0	219.0	29	2	91.4	145.0	231.9	34	4	79.9	140.9	248.6	39	6	71.1	123.6	215.7
18	6	89.6	136.4	206.3	24	1	97.9	147.0	219.3	29	3	91.1	145.0	232.3	34	5	79.6	140.6	248.7	40	0	71.0	123.0	214.0
19	0	90.0	137.0	207.0	24	2	97.7	147.0	219.6	29	4	90.9	145.0	232.7	34	6	79.3	140.3	248.9	40	1	70.9	122.0	211.1
19	1	90.4	137.6	207.7	24	3	97.6	147.0	219.9	29	5	90.6	145.0	233.1	35	0	79.0	140.0	249.0	40	2	70.7	121.0	208.3
19	2	90.9	138.1	208.4	24	4	97.4	147.0	220.1	29	6	90.3	145.0	233.6	35	1	78.7	139.7	249.0	40	3	70.6	120.0	205.4
19	3	91.3	138.7	209.1	24	5	97.3	147.0	220.4	30	0	90.0	145.0	234.0	35	2	78.4	139.4	249.0	40	4	70.4	119.0	202.6
19	4	91.7	139.3	209.9	24	6	97.1	147.0	220.7	30	1	89.7	144.9	234.6	35	3	78.1	139.1	249.0	40	5	70.3	118.0	199.7
19	5	92.1	139.9	210.6	25	0	97.0	147.0	221.0	30	2	89.4	144.7	235.1	35	4	77.9	138.9	249.0	40	6	70.1	117.0	196.9
19	6	92.6	140.4	211.3	25	1	97.0	147.0	221.3	30	3	89.1	144.6	235.7	35	5	77.6	138.6	249.0	41	0	70.0	116.0	194.0
20	0	93.0	141.0	212.0	25	2	97.0	147.0	221.6	30	4	88.9	144.4	236.3	35	6	77.3	138.3	249.0	41	1	69.9	115.1	191.3
20	1	93.3	141.3	212.3	25	3	97.0	147.0	221.9	30	5	88.6	144.3	236.9	36	0	77.0	138.0	249.0	41	2	69.7	114.3	188.6
20	2	93.6	141.6	212.6	25	4	97.0	147.0	222.1	30	6	88.3	144.1	237.4	36	1	76.7	137.6	248.3	41	3	69.6	113.4	185.9
20	3	93.9	141.9	212.9	25	5	97.0	147.0	222.4	31	0	88.0	144.0	238.0	36	2	76.4	137.1	247.6	41	4	69.4	112.6	183.1
20	4	94.1	142.1	213.1	25	6	97.0	147.0	222.7	31	1	87.7	144.0	238.6	36	3	76.1	136.7	246.9	41	5	69.3	111.7	180.4
20	5	94.4	142.4	213.4	26	0	97.0	147.0	223.0	31	2	87.4	144.0	239.1	36	4	75.9	136.3	246.1	41	6	69.1	110.9	177.7
20	6	94.7	142.7	213.7	26	1	96.7	146.9	223.4	31	3	87.1	144.0	239.7	36	5	75.6	135.9	245.4	42	0	69.0	110.0	175.0
21	0	95.0	143.0	214.0	26	2	96.4	146.7	223.9	31	4	86.9	144.0	240.3	36	6	75.3	135.4	244.7					
21	1	95.3	143.3	214.3	26	3	96.1	146.6	224.3	31	5	86.6	144.0	240.9	37	0	75.0	135.0	244.0					

LVW/HW (Lateral Ventricular Width/Hemispheric Width) Ratio, Johnson

Johnson ML, Dunne MG, Mack LA, Rashbaum CL. "Evaluation of Fetal Intracranial Anatomy by Static and Real-Time Ultrasound." *Journal of Clinical Ultrasound* 8:311, 1980.

LVW/HW Ratio = LVW/HW * 100

MA	-2SD, Mean, +2SD	MA	-2SD, Mean, +2SD	MA	-2SD, Mean, +2SD	MA	-2SD, Mean, +2SD	MA	-2SD, Mean, +2SD
15 wk	{40,56,71}	21 wk	{27,35,43}	27 wk	{23,28,34}	33 wk	{25,31,37}	39 wk	{24,29,34}
16 wk	{45,57,69}	22 wk	{26,32,38}	28 wk	{18,32,45}	34 wk	{23,28,33}	40 wk	{22,28,33}
17 wk	{42,52,62}	23 wk	{24,33,42}	29 wk	{22,30,37}	35 wk	{26,29,31}	41 wk	{22,28,33}
18 wk	{40,46,52}	24 wk	{23,31,39}	30 wk	{26,30,34}	36 wk	{23,29,34}	42 wk	{22,28,33}
19 wk	{40,46,52}	25 wk	{26,34,42}	31 wk	{23,30,36}	37 wk	{24,29,34}		
20 wk	{29,43,57}	26 wk	{24,30,36}	32 wk	{26,31,36}	38 wk	{24,29,34}		

TCD/AC Ratio, Meyer

Meyer WJ, Gauthier DW, Goldenberg B, Santolaya J, Sipos J, Cattledge F. "The Fetal Transverse Cerebellar Diameter/Abdominal Circumference Ratio: A Gestational Age-Independent Method of Assessing Fetal Size." *Journal of Ultrasound in Medicine* 12:379, 1993.

TCD/AC Ratio: TCD/AC *100
Mean of the ratio = (mean of TCD)/(mean of AC) * 100
Normal Range: 12.50 ≦(TCD/AC * 100) ≦ 14.86

Wk	Day	5%	Mean	95%
14	0	12.5	13.7	14.9
14	1	12.5	13.7	14.9
14	2	12.5	13.7	14.9
14	3	12.5	13.7	14.9
14	4	12.5	13.7	14.9
14	5	12.5	13.7	14.9
14	6	12.5	13.7	14.9
15	0	12.5	13.7	14.9
15	1	12.5	13.7	14.9
15	2	12.5	13.7	14.9
15	3	12.5	13.7	14.9
15	4	12.5	13.7	14.9
15	5	12.5	13.7	14.9
15	6	12.5	13.7	14.9
16	0	12.5	13.7	14.9
16	1	12.5	13.7	14.9
16	2	12.5	13.7	14.9
16	3	12.5	13.7	14.9
16	4	12.5	13.7	14.9
16	5	12.5	13.7	14.9
16	6	12.5	13.7	14.9
17	0	12.5	13.7	14.9
17	1	12.5	13.7	14.9
17	2	12.5	13.7	14.9
17	3	12.5	13.7	14.9
17	4	12.5	13.7	14.9
17	5	12.5	13.7	14.9
17	6	12.5	13.7	14.9
18	0	12.5	13.7	14.9
18	1	12.5	13.7	14.9
18	2	12.5	13.7	14.9
18	3	12.5	13.7	14.9
18	4	12.5	13.7	14.9
18	5	12.5	13.7	14.9
18	6	12.5	13.7	14.9
19	0	12.5	13.7	14.9
19	1	12.5	13.7	14.9
19	2	12.5	13.7	14.9
19	3	12.5	13.7	14.9
19	4	12.5	13.7	14.9

Wk	Day	5%	Mean	95%
19	5	12.5	13.7	14.9
19	6	12.5	13.7	14.9
20	0	12.5	13.7	14.9
20	1	12.5	13.7	14.9
20	2	12.5	13.7	14.9
20	3	12.5	13.7	14.9
20	4	12.5	13.7	14.9
20	5	12.5	13.7	14.9
20	6	12.5	13.7	14.9
21	0	12.5	13.7	14.9
21	1	12.5	13.7	14.9
21	2	12.5	13.7	14.9
21	3	12.5	13.7	14.9
21	4	12.5	13.7	14.9
21	5	12.5	13.7	14.9
21	6	12.5	13.7	14.9
22	0	12.5	13.7	14.9
22	1	12.5	13.7	14.9
22	2	12.5	13.7	14.9
22	3	12.5	13.7	14.9
22	4	12.5	13.7	14.9
22	5	12.5	13.7	14.9
22	6	12.5	13.7	14.9
23	0	12.5	13.7	14.9
23	1	12.5	13.7	14.9
23	2	12.5	13.7	14.9
23	3	12.5	13.7	14.9
23	4	12.5	13.7	14.9
23	5	12.5	13.7	14.9
23	6	12.5	13.7	14.9
24	0	12.5	13.7	14.9
24	1	12.5	13.7	14.9
24	2	12.5	13.7	14.9
24	3	12.5	13.7	14.9
24	4	12.5	13.7	14.9
24	5	12.5	13.7	14.9
24	6	12.5	13.7	14.9
25	0	12.5	13.7	14.9
25	1	12.5	13.7	14.9
25	2	12.5	13.7	14.9

Wk	Day	5%	Mean	95%
25	3	12.5	13.7	14.9
25	4	12.5	13.7	14.9
25	5	12.5	13.7	14.9
25	6	12.5	13.7	14.9
26	0	12.5	13.7	14.9
26	1	12.5	13.7	14.9
26	2	12.5	13.7	14.9
26	3	12.5	13.7	14.9
26	4	12.5	13.7	14.9
26	5	12.5	13.7	14.9
26	6	12.5	13.7	14.9
27	0	12.5	13.7	14.9
27	1	12.5	13.7	14.9
27	2	12.5	13.7	14.9
27	3	12.5	13.7	14.9
27	4	12.5	13.7	14.9
27	5	12.5	13.7	14.9
27	6	12.5	13.7	14.9
28	0	12.5	13.7	14.9
28	1	12.5	13.7	14.9
28	2	12.5	13.7	14.9
28	3	12.5	13.7	14.9
28	4	12.5	13.7	14.9
28	5	12.5	13.7	14.9
28	6	12.5	13.7	14.9
29	0	12.5	13.7	14.9
29	1	12.5	13.7	14.9
29	2	12.5	13.7	14.9
29	3	12.5	13.7	14.9
29	4	12.5	13.7	14.9
29	5	12.5	13.7	14.9
29	6	12.5	13.7	14.9
30	0	12.5	13.7	14.9
30	1	12.5	13.7	14.9
30	2	12.5	13.7	14.9
30	3	12.5	13.7	14.9
30	4	12.5	13.7	14.9
30	5	12.5	13.7	14.9
30	6	12.5	13.7	14.9
31	0	12.5	13.7	14.9

Wk	Day	5%	Mean	95%
31	1	12.5	13.7	14.9
31	2	12.5	13.7	14.9
31	3	12.5	13.7	14.9
31	4	12.5	13.7	14.9
31	5	12.5	13.7	14.9
31	6	12.5	13.7	14.9
32	0	12.5	13.7	14.9
32	1	12.5	13.7	14.9
32	2	12.5	13.7	14.9
32	3	12.5	13.7	14.9
32	4	12.5	13.7	14.9
32	5	12.5	13.7	14.9
32	6	12.5	13.7	14.9
33	0	12.5	13.7	14.9
33	1	12.5	13.7	14.9
33	2	12.5	13.7	14.9
33	3	12.5	13.7	14.9
33	4	12.5	13.7	14.9
33	5	12.5	13.7	14.9
33	6	12.5	13.7	14.9
34	0	12.5	13.7	14.9
34	1	12.5	13.7	14.9
34	2	12.5	13.7	14.9
34	3	12.5	13.7	14.9
34	4	12.5	13.7	14.9
34	5	12.5	13.7	14.9
34	6	12.5	13.7	14.9
35	0	12.5	13.7	14.9
35	1	12.5	13.7	14.9
35	2	12.5	13.7	14.9
35	3	12.5	13.7	14.9
35	4	12.5	13.7	14.9
35	5	12.5	13.7	14.9
35	6	12.5	13.7	14.9
36	0	12.5	13.7	14.9
36	1	12.5	13.7	14.9
36	2	12.5	13.7	14.9
36	3	12.5	13.7	14.9
36	4	12.5	13.7	14.9
36	5	12.5	13.7	14.9

Wk	Day	5%	Mean	95%
36	6	12.5	13.7	14.9
37	0	12.5	13.7	14.9
37	1	12.5	13.7	14.9
37	2	12.5	13.7	14.9
37	3	12.5	13.7	14.9
37	4	12.5	13.7	14.9
37	5	12.5	13.7	14.9
37	6	12.5	13.7	14.9
38	0	12.5	13.7	14.9
38	1	12.5	13.7	14.9
38	2	12.5	13.7	14.9
38	3	12.5	13.7	14.9
38	4	12.5	13.7	14.9
38	5	12.5	13.7	14.9
38	6	12.5	13.7	14.9
39	0	12.5	13.7	14.9
39	1	12.5	13.7	14.9
39	2	12.5	13.7	14.9
39	3	12.5	13.7	14.9
39	4	12.5	13.7	14.9
39	5	12.5	13.7	14.9
39	6	12.5	13.7	14.9
40	0	12.5	13.7	14.9
40	1	12.5	13.7	14.9
40	2	12.5	13.7	14.9
40	3	12.5	13.7	14.9
40	4	12.5	13.7	14.9
40	5	12.5	13.7	14.9
40	6	12.5	13.7	14.9
41	0	12.5	13.7	14.9
41	1	12.5	13.7	14.9
41	2	12.5	13.7	14.9
41	3	12.5	13.7	14.9
41	4	12.5	13.7	14.9
41	5	12.5	13.7	14.9
41	6	12.5	13.7	14.9
42	0	12.5	13.7	14.9

Other Calculations

Corrected BPD, Doubliet

Doubliet PM, Greenes RA. "Improved Prediction of Gestational Age from Fetal Head Measurements." *American Journal of Roentgenology.* 142:797, 1984.

Corrected BPD = $(BPD * OFD/1.265)^{1/2}$
Valid Range: 13 to 41 weeks

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Body Surface Area

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Schiller NB, Shah PM, Crawford M, et al. "Recommendations for Quantitation of the Left Ventricle by Two-Dimensional Echocardiography." *Journal of the American Society of Echocardiography* 2(5):364, 1989.

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Left Ventricular End-Diastolic Volume and Left Ventricular End-Systolic Volume

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Dodge HT, Sandler H, Ballew DW, Lord JD. "The Use of Biplane Angiocardiography for the Measurement of Left Ventricular Volume in Man." *American Heart Journal* 60(5):762-776, 1960.

Teichholz Formula

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Simpson Bi-Plane

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Stroke Index

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Stroke Volume

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Volume

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AO/LA (Aorta/Left Atrium) Ratio

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mVcf (Mean Velocity of left ventricular Circumferential Fiber shortening)

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Medical Ultrasound Safety

Part One: Bioeffects and Biophysics
Part Two: Prudent Use
Part Three: Implementing ALARA

American Institute of Ultrasound in Medicine

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Table of Contents

Preface

With the availability of an output display in some present and in future diagnostic ultrasound equipment and the potential for higher output capabilities within these devices, it is incumbent upon the user to be knowledgeable of the uses of this equipment and the potential for ultrasound-induced bioeffects. The responsibility for patient safety is falling more heavily upon the ultrasound equipment user's shoulders and the need for an educational background in these uses and bioeffects is evident. In other words, there is a shift in responsibility for patient safety from the manufacturer to the user. In this regard, this tripartite brochure has been generated to provide the user with a working background and general principles that will provide for the understanding of the purpose and use of the Output Display Standard and how this display can be used to obtain diagnostic information with ultrasound exposure as low as reasonably achievable. The user education requirement represents a new level of responsibility that will permit increased ultrasound diagnostic capabilities within the context of user controlled ultrasound exposure. Information regarding ALARA and possible ultrasound bioeffects described in this brochure also applies to equipment without an output display.

—*Michael S. Tenner, M.D.*
AIUM President

Introduction

A new feature, called an output display, is becoming available on some recently introduced and future diagnostic ultrasound equipment. The output display provides the user an indication of the potential for bioeffects that might be caused by the ultrasound energy being emitted. With this information, users can better control the diagnostic ultrasound equipment and examination to assure that needed diagnostic information is obtained with a minimum of risk to the patient.

To get the most benefit from the output display, the user should have a basic understanding of the nature of ultrasound-induced bioeffects, how to conduct an exam that minimizes the potential for bioeffects, and how to operate the controls of the equipment used in the exam.

This brochure is divided into three parts. Part One describes ultrasound-induced bioeffects and why we should be concerned about them. Part Two describes the risks and benefits of conducting diagnostic examinations and introduces the concept of ALARA, that is, ultrasound exposure As Low As Reasonably Achievable. Using ALARA, we can obtain needed diagnostic information with minimum risk to the patient. Part Three describes how to implement ALARA on equipment with and without an output display. With an output display, we have the best information about the potential for bioeffects and can make the best decisions.

Each manufacturer's equipment has somewhat different control features. This brochure can only provide general principles about ALARA and diagnostic ultrasound equipment. Please refer to the user documentation for your particular equipment to learn the details of its particular controls and output displays.

Acknowledgements

The development of this Ultrasound Education Program brochure went through a number of style and format changes and involved dedicated professionals from a number of organizations over the past three years. Initially, three videotapes were planned with the creation of three scripts. What finally emerged is this brochure. There are many individuals to thank. Special recognition is given to Mr. Chas Burr for his extensive revisions to the final content of the text. Without their assistance, this brochure would not have been possible.

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— William D. O'Brien, Jr., PhD
— Terrence J. Sweeney
Co–Editors
September 1994

Part One
Bioeffects and Biophysics

"Diagnostic ultrasound has proven to be a valuable tool in medical practice. An excellent safety record exists in that, after decades of clinical use, there is no known instance of human injury as a result of exposure to diagnostic ultrasound. Evidence exists, however, to indicate that at least a hypothetical risk for clinical diagnostic ultrasound must be presumed."

Radiological Health Bulletin,
Vol XXIV, No. 8,
August 1990

Chapter One
Is It Safe?

Issues Addressed:

- Why it is important to know ultrasound physics
- What dose-effect studies tell us
- Mechanisms of ultrasound-induced biological effects
- History of ultrasound
- Prudent use

Everyone thinks ultrasound is safe.

Q. Everyone thinks that ultrasound is safe. We keep hearing, “no known instance of human injury as a result of exposure to diagnostic ultrasound.” So why do we have to learn about biophysics and bioeffects?

There is a potential risk.

A. When ultrasound propagates through human tissue, there is a <u>potential</u> for tissue damage. There has been much research aimed at understanding and evaluating the potential for ultrasound to cause tissue injury. Through these studies, we are trying to learn what causes ultrasonic bioeffects and apply that information to diagnostic ultrasound. Many studies are dose-effect studies. These laboratory studies give us two things: First, they provide an opportunity to use much higher dosage levels than those currently used in a diagnostic ultrasound exam to really test the safety of ultrasound, and second, they permit a detailed study of mechanisms thought to be responsible for bioeffects.

Dose-effect studies

Q. So dose-effect studies are performed at higher intensities than diagnostic ultrasound?

A. Much higher levels. In fact, virtually all ultrasonically induced adverse biological effects have occurred at these higher intensity levels.

Q. What’s been learned from the dose-effect studies?

Thermal Mechanism
Nonthermal Mechanism

A. So far, we’ve deduced that two mechanisms are known to alter biological systems. One, called the “Thermal Mechanism,” refers to heating of soft tissue and bone. The other, “Nonthermal,” involves mechanical phenomena such as cavitation, although nonthermal mechanisms are more than cavitation alone. You can think of cavitation as the interaction of ultrasound with tiny bubbles in tissue and liquids.

History of ultrasound

Q. How long have we known of the potential hazards of ultrasound?

A. In 1880, two French scientists, Jacques and Pierre Curie, discovered piezoelectricity, the basis for ultrasonic transducers. About thirty-five years later, another French scientist named Paul Langevin developed one of the first uses of ultrasound, underwater sound-ranging of submerged objects known today as sonar. In the process he discovered and reported that very high intensity ultrasonic levels could have a detrimental effect on small aquatic animals.

Ten years later, scientists Wood and Loomis conducted experiments that substantiated Langevin's observation. Then, in 1930, Harvey published a paper about the physical, chemical, and biological effects of ultrasound, reporting that alterations were produced in a variety of organisms, cells, tissue, and organs. Long before anyone even thought of using ultrasound to produce images of the human body, it was already known that high levels of ultrasound were hazardous. With this in mind, early pioneering engineers and clinicians who were designing ultrasound imaging devices knew about the potential for disrupting biological tissue.

Thus, there has been concern about potential harmful effects throughout the entire period of diagnostic instrumentation development.

If there's a potential for bioeffects . . .

Q. If there's a potential for bioeffects, why do we use ultrasound?

No patient injury has ever been reported from diagnostic ultrasound.

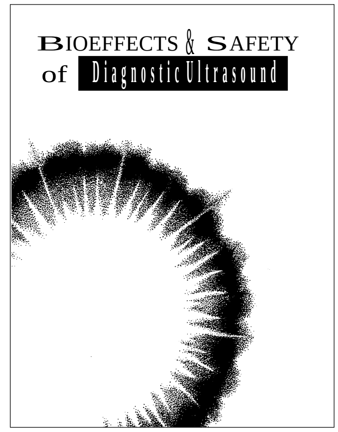
A. Most important, we use ultrasound because of its many diagnostic uses and benefits. Although there may be a risk, there has never been a documented instance of a patient being injured from this diagnostic modality.

Q. If there is a potential for ultrasound-caused bioeffects, why has there been such a good safety record?

Diagnostic ultrasound equipment is regulated by the FDA.

A. As the uses of medical devices have grown and more application areas and equipment have been developed, regulations have been enacted to provide for patient safety concurrent with equipment development. In 1976, the Medical Device Amendments to the Food, Drug, and Cosmetic Act were enacted requiring the Food and Drug Administration (FDA) to regulate all medical devices, including diagnostic ultrasound equipment. The FDA has required manufacturers of diagnostic ultrasound equipment to keep acoustic output below that of machines on the market before 1976, the year the amendments were enacted. Manufacturers bringing new products to market must compare the various performance characteristics of ultrasound equipment, including acoustic output, to devices previously approved for marketing.

Within these "limits," ultrasound has shown itself to be a safe and effective diagnostic tool for medical application. But it is important to remember that the pre-1976 output levels are based in history, not on scientific safety evaluations.



In March 1993, the American Institute of Ultrasound in Medicine approved the Official Statement on Clinical Safety:

"Diagnostic ultrasound has been in use since the late 1950s. Given its known benefits and recognized efficacy for medical diagnosis, including use during human pregnancy, the American Institute of Ultrasound in Medicine herein addresses the clinical safety of such use: No confirmed biological effects on patients or instrument operators caused by exposure at intensities typical of present diagnostic ultrasound instruments have ever been reported. Although the possibility exists that such biological effects may be identified in the future, current data indicate that the benefits to patients of the prudent use of diagnostic ultrasound outweigh the risks, if any, that may be present."

"... the benefits to patients of the prudent use of diagnostic ultrasound outweigh the risks, if any, that may be present."

(From *Bioeffects and Safety of Diagnostic Ultrasound,* published in 1993 by the American Institute of Ultrasound in Medicine)

Q. Why is there more discussion of ultrasound safety now than in the past?

History of ultrasound in medicine

A. The question of safety is being discussed more because more and more applications are being found, and the industry is producing technically sophisticated devices that provide more diagnostic information. Current dialogue among the medical community, manufacturers, and the FDA suggests that new standards recently developed should allow higher outputs for greater diagnostic capability. This will improve some imaging and Doppler situations, but with greater risk and greater operator responsibility.

Higher outputs bring potentially greater risk.

Just because we haven't detected bioeffects on humans at diagnostic levels, doesn't mean that they don't exist. We know the potential for risk exists. It's important for ultrasound users to know about biophysics and bioeffects so they can make informed decisions about the use of ultrasound and can reduce the chances of bioeffects occurring. In the future, more and more decisions about the use of ultrasound output levels will be made by equipment operators.

Prudent use

The use of ultrasound in medicine began in the 1950s. At that time, the number of applications was rather limited. The uses for ultrasound grew in the 1950s, adding applications such as cardiology, obstetrics, gynecology, vascular, ophthalmic, and the imaging of regions of the

body, such as the female breast and male pelvis. By the early 1960s most of the basic ultrasound applications used today had been attempted, although with much less diagnostic content than today. Clinical use continued to grow during the 1970s with the introduction of real-time scanning.

Early exams were conducted entirely through the skin surface, but intracavitary and intraoperative applications have undergone a recent surge as manufacturers and clinicians seek to expand the diagnostic potential of ultrasound. Today, the clinical uses for ultrasound are many and varied, and diagnostic ultrasound is one of the fastest growing imaging techniques in medicine. Surveys in the United States indicate that a very high percentage of pregnant women are scanned to obtain fetal health information. There are about 100 thousand medical ultrasound scanners in use worldwide. This equipment handles millions of examinations each year. And, the number continues to grow.

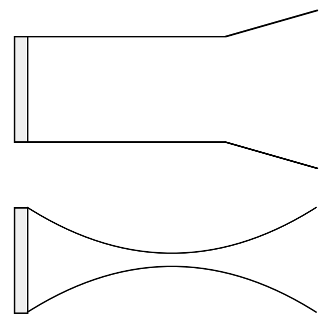
Chapter Two
Thermal Bioeffects

Issues Addressed:

- Focused and unfocused ultrasound fields
- Spatial and temporal considerations
- Attenuation, absorption, and scattering
- Soft tissue, layered and fetal bone models
- Soft tissue, layered and fetal bone heating
- Axial temperature increase profiles

Q. If ultrasound causes tissue temperature to rise, where is the largest temperature rise found?

A. The highest temperatures tend to occur in tissue in the region between where the ultrasound beam enters tissue and the focal region.



Unfocused and focused ultrasound fields.

Because the temperature elevation is related to both ultrasonic power and the volume of exposed tissue, we need to keep in mind whether the beam is scanned or unscanned, in other words, whether the equipment moves the beam or keeps it stationary. Scanned modes, such as B-mode imaging and color flow Doppler, distribute the energy over a large volume. In scanned modes, the highest temperature is frequently at the surface where the ultrasound enters the body.

Unscanned modes, such as spectral Doppler and M-mode, concentrate the power along a single line in the patient and deposit energy along the stationary ultrasound beam. Energy is distributed over a much smaller volume of tissue than in the scanned case. In unscanned modes, the highest temperature increase is found between the surface and the focus. In other words, the hottest point is along the center axis of the beam and proximal to the focal point, but not at the focal point. The exact location depends on the tissue attenuation and absorption properties and the beam's focal length. For long focal lengths, the location of the maximum temperature elevation may lie closer to the surface, but for short focal lengths, it is generally closer to the focus.

Spatial considerations

$$\text{Intensity} = \frac{\text{Power}}{\text{Area}}$$

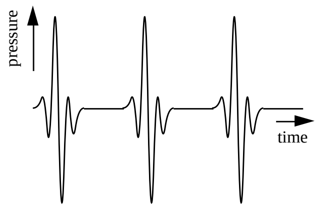
Q. Focusing the ultrasound beam increases the temperature?

A. Focusing concentrates the power in the beam on a small area, thereby improving image lateral resolution, but also causing higher intensities and the potential for higher temperatures.

Q. What other aspects of the ultrasound beam affect the temperature?

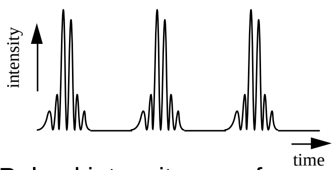
Temporal considerations

A. An important aspect is time.



Pulsed pressure waveform

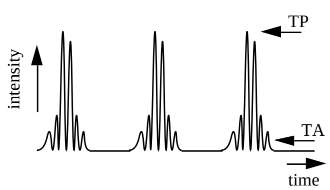
Ultrasonic waves can be emitted in pulsed wave form. There's a burst of energy, then, there's a period of silence. Then, there's another pulse and more silence, and on and on. During the pulse the acoustic intensity is high, but during the silence the intensity is zero.



Pulsed intensity waveform

If we take the entire repeating time period, both the pulse and the silence, and average the intensity of the ultrasound over time, we come up with a temporal-average intensity that may be a thousand times smaller than the instantaneous or temporal-peak intensity that occurs once during the pulse. Bioeffects resulting from temperature increases depend, in part, on the temporal-average intensity.

The intensity at the location of the greatest temporal-average intensity is referred to as the spatial-peak temporal-average intensity: SPTA. The SPTA is often used as a specification of ultrasound output.



Temporal-average (TA) and temporal-peak (TP) intensities

Ultrasound exposure duration

In addition to time averaging, there's another time concept that affects temperature increase: duration of the ultrasound exposure, or how long one location is imaged during an examination. It takes time for tissue temperature to rise, and the longer the exposure duration, the greater the possibility of a biological effect.

Q. What causes the temperature rise in tissue during ultrasonic exposure?

A. The absorption of energy. During an exam, much of the ultrasound energy is absorbed by body tissue. If the rate of energy deposition in a particular region exceeds the body's ability to dissipate the heat, the local temperature will rise.

Attenuation
1. Absorption = energy converted to heat
2. Scattering = redirection of ultrasound

Absorption and attenuation are often confused. Attenuation is the loss of energy from the propagated ultrasound wave. There are two causes for attenuation: Absorption and scattering. Absorption is the conversion of ultrasonic energy into heat; whereas, scattering is the redirection of the ultrasound away from the direction it was originally traveling.

Absorption of acoustic energy by tissue results in the generation of heat in the tissue. This is what is referred to as the thermal mechanism. There are a number of physical and physiological variables that play a role in absorption and the generation of temperature increases. Some, of course, are the operating characteristics of the equipment. For now, let's concentrate on physical parameters.

Q. What are some of the physical parameters that affect absorption?

A. The ultrasound energy is absorbed by tissue, at least to some extent.

The extent depends on the tissue, on what we call tissue absorption characteristics.

Attenuation coefficient and absorption coefficient have the same units—dB/cm or dB/cm-MHz

A specific way in which tissue absorption characteristics are quantified is with the "Absorption Coefficient." The absorption coefficient is expressed in decibels per centimeter. Since absorption coefficient is directly proportional to ultrasonic frequency, the coefficient is often normalized to frequency and represented as decibels per centimeter per megahertz. Absorption coefficients are very dependent on the organ or tissue type that is being imaged.

Increasing Attenuation
<u>Coefficient</u>
Water
Biological fluids
Soft tissues
Skin and cartilage
Fetal bone
Adult bone

Q. Let's get some examples. What's the absorption coefficient of, say, fluids, like amniotic fluid, blood, and urine?

A. Almost zero. These fluids absorb very little ultrasonic energy. That means the ultrasound goes through the fluid with very little decrease. And there's little temperature elevation in the fluid.

Q. Which body tissue absorbs the most energy?

A. Bone. Its absorption coefficient is very high. Dense bone absorbs the energy very quickly and causes the temperature to rise rapidly. Adult bone absorbs nearly all of the acoustic energy impinging on it. Fetal bone absorption coefficients vary greatly depending on the degree of ossification.

Q. Now what's between fluid and bone?

A. Soft tissue. Tissues vary in density depending on the particular organ, but the density doesn't vary much within a organ. We call it soft to distinguish it from hard tissue such as bone. It's also true that the tissue density within a particular organ is not always the same. But, for our purposes we assume that attenuation and absorption are uniform throughout the organ. We call this a homogeneous soft tissue model.

Homogeneous soft tissue model

Q. How does frequency affect absorption?

A. The higher the frequency, the higher the absorption. What that means to operators is that a higher-frequency transducer will not allow us to "see" as far into the body.

Q. Does that mean that higher-frequency transducers create more heat?

Higher Frequency = Increased Absorption, Reduced Penetration, Possible Near Surface Heating

A. Not necessarily. There are many factors that contribute to creating heat. However, if all other factors are equal, the ultrasound energy of higher-frequency transducers is absorbed more rapidly than that of

lower-frequency transducers, thereby causing reduced penetration. In some cases, this may introduce increased heating near the skin surface.

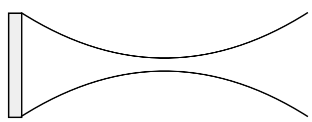
However, due to the rapid absorption of higher-frequency ultrasound, there's another indirect effect that might occur. If we're not getting deep enough, we might choose to increase the output, and the increased intensity could also increase temperature.

Q. Now let's talk about what all this means in practical terms. What is the situation of most interest?

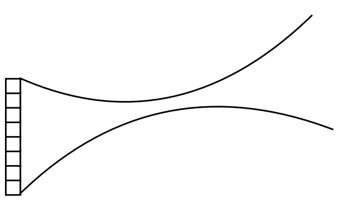
A. The situation of greatest interest involves the fetus with ossified bone (second and third trimester) and a mother with a thin abdominal wall. Because there would be little absorption of energy between the transducer and the fetus, nearly all of the energy would be absorbed by a fetal bone, if the beam is focused on or close to it.

Q. What can we as operators do to minimize temperature rise?

A. First, temperature increases depend on intensity, duration of exposure at the same location, transducer focal point size and location, and absorption of the energy by the tissue. In general, intensity is alterable, and depends on the particular equipment we're using. As the operator, we can also control duration, or exposure time. The transducer is typically moved frequently during the exam, which will naturally reduce the exposure duration at a specific tissue location.



Fixed-focus transducer



Multi-element array transducer

Let's look at the other two factors: transmit focal point and absorption. A highly focused beam whose focal point is in the amniotic fluid will not cause significant heating of the fluid, because its absorption coefficient is low. If the focus is in tissue, all things being the same, the temperature rise is a little higher. However, the same beam will cause an even higher temperature rise time if it focuses on bone, which has a much higher absorption coefficient. Be aware that there are fixed-focused transducers whose focus we can't change and multi-element array transducers whose focus we can change.

The other important determinant of local temperature rise is absorption of ultrasound energy in tissue layers in front of the point of interest. Increased absorption in these layers decreases the ultrasound energy available at the point of interest. For example, an obstetrical examination of a patient with a thick abdominal wall is less likely to cause a significant temperature increase in the fetus than an examination through a thin abdominal wall.

Q. What are some examples of temperature increase calculations?

A. We have computer models that predict the relationship between transducer focus and changes in the temperature curve.

Computer Tissue Models

- Homogeneous Soft Tissue Model
- Layered Tissue (Fluid-filled Bladder) Model
- Fetal Bone Model

Assumptions

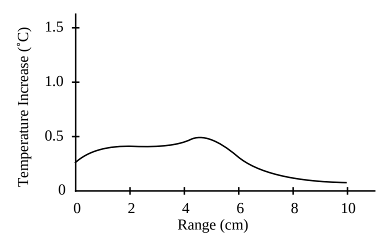
- Speed of Sound Is Uniform Throughout
- Attenuation Is Uniform Throughout
- Absorption Is Uniform Throughout
- Absorption Equals Attenuation (Scattering is negligible)

Modeling various tissue layers is difficult since there are so many. We focused on two simplified models. In the first, ultrasound travels through homogeneous soft tissue. In the second, ultrasound travels through a fluid-filled bladder. We assumed that the speed of sound, acoustic impedance, attenuation, and absorption are uniform throughout the volume of interest.

Transducer

- 3.0 MHz
- 19 mm diameter
- 6 cm transmit focal length
- 100 mW output ultrasonic power

We also selected a 3.0 MHz, 19 mm diameter transducer with a 6 cm transmit focal length. For convenience, we have used an ultrasonic output of 100 mW for our example. This is a relatively high output level for today's diagnostic equipment, only found in some Doppler and color Doppler modes. Keep in mind, these models are for educational purposes and may not reflect actual clinical situations.



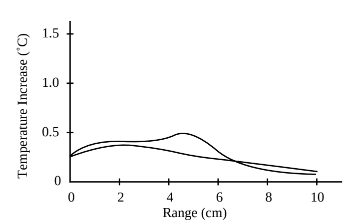
Homogeneous soft tissue model: axial temperature increase profile for a transmit focal length of 6 cm

Homogeneous Tissue Model: Abdominal Exam

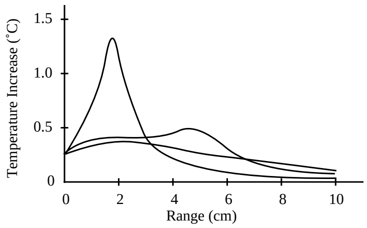
First, let's look at the homogeneous tissue model. This model is similar to the situation in an abdominal exam involving soft tissue only. The temperature increase in degrees Celsius goes up the left side of the figure. The range in centimeters goes across the bottom of the figure.

We'll see that the temperature increase exhibits a maximum at about five centimeters.

For the next scenario, all we'll change is the focal point location. We just saw the 6 cm focal length. Now, let's see what the same transducer does in the same tissue with a 10 cm focal length. It flattens out quite a bit, doesn't it?



Homogeneous soft tissue model: axial temperature increase profile for a transmit focal length of 6 and 10 cm



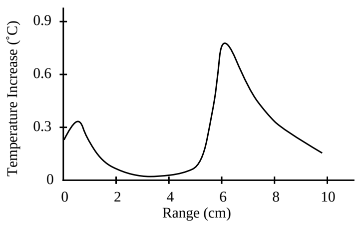
Homogeneous soft tissue model: axial temperature increase profiles for transmit focal lengths of 2, 6, and 10 cm

But look at what happens if the focal length is 2 cm. The temperature goes way up to about 1.3˚C at a range of about 2 cm. What does that mean? It means that a significant increase in temperature near the beam's focus is more likely with shorter focal lengths because less overall attenuation of the beam has occurred.

Now, let's look at this in a situation similar to an obstetrical exam.

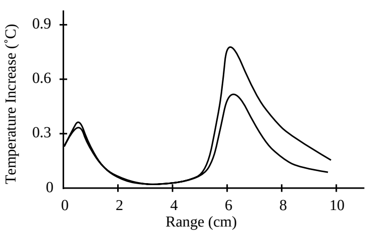
Layered Tissue Model: Obstetrical Scan

- Abdominal wall thickness = 1 cm
- Bladder fluid path = 5 cm



Layered tissue model: axial temperature increase profile for a transmit focal length of 6 cm

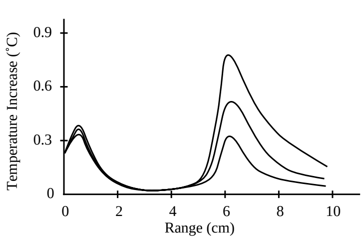
For this situation, we have a layered tissue model based on an obstetrical scan through the abdominal wall and through the fluid-filled bladder to the fetus. For the scenario, we assumed a patient with a thin abdominal wall of 1 cm and a 5 cm fluid path. The transducer and its ultrasonic power are the same as those used in the homogeneous tissue cases. The transmit focal length of 6 cm is at the location of the far side of the bladder and note that the temperature goes up to about 0.8˚C at this range. Also note, the increase in temperature in the abdominal wall is about 0.4˚C. There's almost no absorption of ultrasound in the bladder fluid, so little heat is produced there.



Layered tissue model: axial temperature increase profile for transmit focal lengths of 6 and 10 cm.

Now here's the axial temperature increase profile in the layered tissue model for a longer focal length of 10 cm. The temperature rise at the far side of the bladder is about 0.5˚C, a drop from when the ultrasound beam was focused at that location.

Let's look at a situation where the beam focuses in front of the far side of the bladder, at a 4 cm transmit focal length. The temperature rise at the far side of the bladder is about 0.3˚C, also a drop from when the ultrasound beam is focused at that location. Note that the increase in temperature in the abdominal wall is about 0.4˚C for all three focal length conditions.



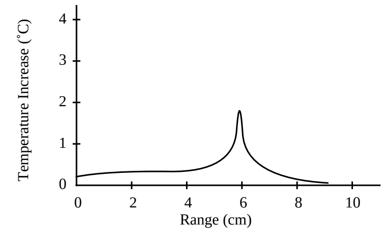
Layered tissue model: axial temperature increase profile for transmit focal lengths of 4, 6 and 10 cm.

That means if the transmit focus location occurs before the target, then the temperature rise at the far side of the bladder, at a range of 6 cm for this layered tissue model, is less than if the focus is at or beyond the target, where the temperature elevation at the target is higher.

Fetal Bone Model

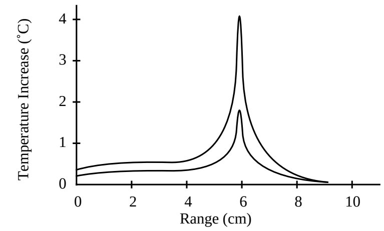
- Homogeneous Soft Tissue Parameters
- Bone Location at 6 cm in Range
- 100 mW Output Ultrasonic Power

Let's see what happens when we focus near bone. For this model, we'll use the homogeneous soft tissue parameters for the tissues through which the beam passes, but our reflective surface is bone that is perpendicular to the beam at a range of 6 cm. We will also use the same output ultrasonic power of 100 mW. When the transmit focal range is beyond the location of bone, focal range of 10 cm, there is a peak in the temperature increase to about 1.9˚C at the bone location.



Fetal bone model: axial temperature increase profile for a transmit focal length of 10 cm

Here's what happens with a transmit focal length of 6 cm, that is, the ultrasound beam is focused on the bone surface: a theoretical temperature rise of about 4.2˚C.



Fetal bone model: axial temperature increase profile for transmit focal lengths of 6 and 10 cm

Q. How does all this apply to actually scanning a patient? Is this dangerous?

A. Potentially dangerous. The examples we looked at are for educational purposes and do not necessarily occur in clinical situations. For example, the output power used for the calculation would not be commonly used, but it is within the capability of many systems.

Temperature rise during an actual examination depends on many factors. For example, very few patients have as thin an abdominal wall as we assumed in this model. In addition, the exposure to bone must be continuous over time for local temperatures to rise. That seldom happens in actual exams. Plus, some heating is lost due to the cooling effect of local blood flow. To date, there is no evidence of any harm in humans from thermal effects at the output levels of current ultrasonic devices.

Abdominal wall thickness,
Focal length and location,
Exposure duration,
Bone attenuation,
Tissue attenuation,
Bone absorption, and
Tissue absorption

Q. But if it's potentially dangerous, why hasn't there been an incident?

A. The combined conditions required to produce these heating effects are unlikely to occur. In addition, the control parameters on current equipment are designed to limit the temporal-average intensity. By minimizing temporal-average intensity, significant thermal effects in the body are not likely to occur. However, it is unclear what output levels will be used in future applications and equipment.

The goal is to get an image that provides <u>necessary</u> diagnostic information. If we are overly cautious, we may end up with poor image quality or inadequate Doppler signals. For operators to minimize the risk, we need to understand the factors that contribute to temperature rise, for example, the thickness of the mother's abdominal wall, the beam focal length and location, exposure duration, and the attenuation and absorption characteristics of tissue and bone.

The goal is to get an image that provides necessary diagnostic information.

Chapter Three
Nonthermal Bioeffects

Issues Addressed:

- Onset of cavitation
- Peak compressional pressure
- Peak rarefactional pressure
- Stable cavitation and transient cavitation
- Microstreaming
- Nucleation site
- Threshold phenomenon

Q. Nonthermal bioeffects means bioeffects not caused by temperature rise. That tells us what they are not. Exactly what are nonthermal bioeffects?

A. Nonthermal bioeffects are not as well understood as thermal effects. They are sometimes referred to as mechanical bioeffects because they seem to be caused by the motion of tissue induced when ultrasound pressure waves pass through or near gas. The majority of the nonthermal interactions deal with the generation, growth, vibration, and possible collapse of microbubbles within the tissue. This behavior is referred to as cavitation.

Cavitation was first discovered around the turn of the century, not in tissues, but at the surface of a ship's propellers. Researchers found that the low-pressure region immediately behind a ship's propellers caused bubbles to be produced in the water. The collapsing bubbles damaged the propellers. The bubbles collapsed violently, generating shock waves that eroded the propeller blades.

What is cavitation—bubbles?

Q. So cavitation is bubbles?

A. With diagnostic ultrasound, cavitation refers to ultrasonically induced activity occurring in tissues or body liquids that contain bubbles or pockets containing gas or vapor. These bubbles originate within materials at locations termed "nucleation sites," the exact nature and source of which are not well understood in a complex medium such as tissue or blood.

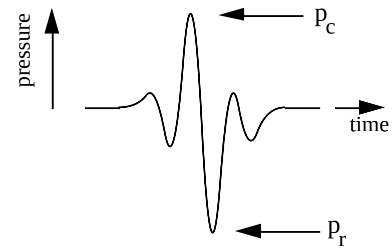
Positive pressure = Compressional pressure

Negative pressure = Rarefactional pressure

A sound wave has positive pressure and negative pressure. Positive pressure is also called compressional pressure; negative pressure is also called rarefactional pressure. If the rarefactional pressure is sufficiently large, microbubbles may be produced, or existing microbubbles may be enlarged.

Q. When does cavitation occur?

A. The occurrence of cavitation and its behavior depend on many factors, including the ultrasonic pressure and frequency, the focused or unfocused and pulsed or continuous ultrasonic field, the degree of standing waves, and the nature and state of the material and its boundaries.



Peak compressional pressure (p_c) and peak rarefactional pressure (p_r)

Q. Is cavitation related to SPTA intensity?

A. No. The correlation is not with temporal-average intensities, but rather with pressure. Cavitation is most closely related to peak negative pressure, or peak rarefactional pressure, during the pulse.

Cavitation depends on
- frequency
- pressure
- focused/unfocused beams
- pulsed/continuous ultrasound
- degree of standing waves
- nature and state of material
- boundaries

Peak negative pressure is roughly related to the pulse-average intensity. So, the spatial-peak pulse-average intensity, the SPPA intensity, is loosely related to cavitation. This relationship is useful to us because many existing ultrasound systems use SPPA intensity as a specification or control.

Q. Are there different types of cavitation?

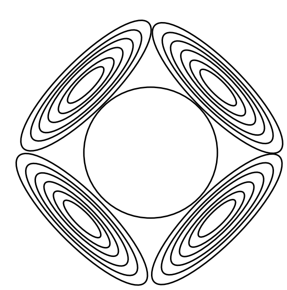
A. Cavitation can be discussed in terms of two categories: stable cavitation and inertial (or transient) cavitation.

Stable cavitation is associated with vibrating gaseous bodies. In stable cavitation a gaseous body remains stabilized and, because of the ultrasonic field, oscillates or pulsates. As the oscillations become established, the liquid-like medium around the gas bubble begins to flow or stream; we call this “microstreaming.” Microstreaming has been shown to produce stress sufficient to disrupt cell membranes.

Cavitation is related to the peak rarefactional pressure.

Cavitation
1. Stable
2. Inertial (or Transient)

During inertial cavitation, pre-existing bubbles or cavitation nuclei expand from the pressure of the ultrasonic field and then collapse in a violent implosion. The whole process takes place in a very short time span that is on the order of microseconds. The implosion can produce huge local temperature rises that may be thousands of degrees Celsius, and pressures equal to hundreds of atmospheres all in an area that is less than one square micrometer. The implosion can damage cells and tissue, ultimately leading to cell death. In addition, bubble implosion can generate highly reactive chemical species. All of these effects, microstreaming, implosion, and reactive chemicals occur in a very small space around the bubble, affecting only a few cells.



Oscillating bubble and microstreaming

Q. Is it really possible for cavitation to occur at the amplitudes and frequencies used for diagnostic ultrasound?

A. Perhaps, if nuclei sites are available. There is ample theoretical and some experimental evidence to support this conclusion, and that biological alterations can occur. We are fortunate to have this evidence because it documents the levels above which cavitation is thought to occur, and because there is a lot of scientific evidence to suggest that the onset of transient cavitation is a threshold phenomenon.

There's a combination of rarefactional pressure values, ultrasonic frequency, and cavitation nuclei that are required for cavitation to occur. If, as evidence suggests, cavitation is a threshold phenomenon, then exposure to pressure levels below the threshold for cavitation will never induce cavitation, no matter how long the exposure lasts.

Can cavitation be produced by diagnostic ultrasound equipment?

Q. Do we know of any incidence of cavitation occurring in human tissue or fluids resulting from diagnostic ultrasonic exposure?

A. Currently, there is no evidence that diagnostic ultrasound exposure has caused cavitation in humans.

In addition, the control parameters on current equipment limit the peak output. However, limits may be raised or eliminated in future equipment.

Q. But, theoretically, it can happen?

A. Yes. But since cavitation would probably affect only a single cell, or a few cells, it is extremely difficult to detect an adverse biological effect, unless the cavitation events were widespread among a large volume of tissue.

Part Two
Prudent Use

"Although the possibility exists that such biological effects may be identified in the future, current data indicate that the benefits to the patient of the *prudent use* of diagnostic ultrasound outweigh the risks, if any, that may be present."

American Institute of Ultrasound in Medicine
Official Statement On Clinical Safety
March 1993

Chapter Four
Benefits And Risks

Issues Addressed:

- Risks versus benefits
- Diagnostic ultrasound benefits
- Risk of not performing the study
- Prudent use
- New technology and applications
- High output, potentially greater risk
- High output, potentially greater diagnostic capability
- Shifting responsibility

Risks vs. benefits

Q. "Risks versus benefits." What do we mean by that in terms of ultrasound?

A. The risks are the potential for adverse bioeffects caused by heating or cavitation. Although there has not been a reported incident of serious bioeffects on humans at diagnostic ultrasound levels, we do know that heating of the tissue may occur and there may be the potential for cavitation to occur.

The benefit is the diagnostic information ultrasound provides. And ultrasound imaging provides very good data, data that allow physicians to make clinical decisions. With information from an ultrasound exam, physicians can weigh alternative courses of action and select the best method for helping the patient.

Ultrasound imaging is popular first and foremost because it's a superb diagnostic modality. It provides tremendous diagnostic information with great sensitivity and specificity. But it's also a favorite imaging technique because it appears safe, is widely accepted by patients, is portable, and is relatively low in cost compared to other diagnostic imaging modalities. Physicians must weigh the expected benefit from a diagnostic ultrasound procedure against the potential risks of that procedure.

Examples of benefits from diagnostic ultrasound: Cardiac studies

Q. What are some examples of the benefits of diagnostic ultrasound?

A. Let's look at ultrasound in cardiac studies. The use of diagnostic ultrasound for cardiac applications has increased dramatically over the past ten years. From M-mode scans to transesophageal echocardiography, ultrasound gives us the ability to image the structure and function of the heart and great vessels in exquisite detail. Ultrasound also has the ability to follow the normal and abnormal course of blood flow within the heart.

Q. How about potential bioeffects with some of the new cardiac applications?

A. Diagnostic ultrasound has an excellent safety record over the years that it's been used to study the heart. The nature of many cardiac ultrasound techniques, the variety of imaging windows, and the fact that the heart is filled with moving blood means that the duration of the exposure of any one area of the heart is reduced.

It's a real risk not to perform the study.

Newer applications of ultrasound through the esophagus and within the vascular space may result in bioeffects we've not previously known about. We need more research before we can define all the risks. But remember, the physician should weigh potential bioeffects against the real risks of not doing the study and missing important timely diagnostic information.

Q. What other medical specialties benefit from ultrasound?

Example of benefits from diagnostic ultrasound: Obstetrical exams

A. Ultrasound has had a huge impact on the area of obstetrics. The use of ultrasound examinations during pregnancy has increased dramatically since the 1970s. The use of ultrasound in obstetrics is a principal area of concern for potential bioeffects. Ongoing studies may provide accurate information related to potential effects of ultrasound on the embryo–fetus. In fact, the combination of the increase in use and the concern for safety led to the National Institutes of Health consensus development conference in the early 1980s. The conference discussed the use of diagnostic ultrasound in pregnancy. The committee did not recommend routine ultrasound examinations during pregnancy, but they did suggest a number of appropriate clinical indications for the use of ultrasound imaging during pregnancy.

Balancing benefits and risks

Q. How do you balance the benefits and risks?

Ultrasound benefits:
- Many diagnostic uses
- Replaces or used with other procedures
- Cost effective
- Patient acceptance
- High quality information

A. Ultrasound imaging during pregnancy is important because it provides a considerable amount of information. On the one hand, ultrasound offers lots of diagnostic uses, may be used to replace some procedures, can be used in conjunction with other procedures, is cost effective, is accepted by patients, and provides a great deal of high quality clinical information.

Prudent use

On the other hand, we have the risks: thermal and nonthermal bioeffects. But there's another risk that must be considered: the risk of not doing the ultrasound exam and either not having the information or having to get it in a less desirable or invasive way. As the American Institute of Ultrasound in Medicine statement says, ". . . *the benefits to patients of the prudent use of diagnostic ultrasound outweigh the risks, if any, that may be present.*"

Q. What about the benefits of new ultrasound technology and applications?

New technology and applications

A. There has been a virtual explosion of technology and applications over the past few years: new manufacturers, new products, new medical specialties, and more and more medical applications. Now we have everything from small hand-held Doppler systems that follow blood flow in peripheral vessels to more general imaging systems that display nearly all of the body's soft tissues in detail.

Users assume more responsibility

But it's more than technology; it's what that technology gives us; for instance, better quality images and more diagnostic information. Still, all the operating modes and the varying output levels mean that more responsibility must be assumed by the users.

Diagnostic ultrasound is widely accepted because it is a superb diagnostic tool with an excellent history of safety. We want to keep it that way. But with more and different types of equipment, larger numbers of patients, and all the new applications, there's increased concern about potential bioeffects.

Q. Now that we understand the potential for ultrasound-induced bioeffects, should we change how we use the equipment?

A. We must learn to balance the risks and the benefits. We have learned about bioeffects: thermal effects, or tissue heating; and mechanical effects, such as cavitation. We learned how intensity, exposure time, focal properties, and pressure are associated with the risk for bioeffects. Using too much intensity can increase the risks, but using too little intensity for the clinical situation can lead to poor images and the loss of essential information.

When we use ultrasonic devices, we should remember the safety concerns. Ultrasound should neither be used as a "toy" or without clinical need, nor should it be considered as "perfectly safe." We know and have known for more than 75 years that ultrasound, at certain levels, can alter biological systems. There will always be a need for continued awareness of future research findings. But we also know that one should not hesitate to have a diagnostic ultrasound examination when there is clinical benefit to be derived.

Future benefit vs. risk

Q. In the future, might there be increased risk as well as increased benefit?

A. The future may be quite different. If existing acoustic output limits were removed, the primary responsibility for the safety of acoustic output would shift from design restrictions, as on current diagnostic

ultrasound devices, to the judgement of the users. In return for potentially enhanced diagnostic capabilities, we will have to balance the clinical need against the risk of an adverse bioeffect. We will need a knowledge of the thermal and mechanical mechanisms, the bioeffects of ultrasound, the ultrasound output levels being used, and the relationship of output level to image quality.

Chapter Five
ALARA

Issues Addressed:

- The ALARA principle
- Controlling ultrasonic energy
- Controlling exposure time
- System capability and ALARA
- Operating mode and ALARA
- Transducer capability and ALARA
- System setup and ALARA
- Scanning technique and ALARA

Q. Knowing that ultrasound energy is related to potential bioeffects, how can we reduce the risks?

A. We have a simple principle that we can apply to the use of ultrasound energy. It's called ALARA, which stands for "As Low As Reasonably Achievable." Following the ALARA principle means that we keep total ultrasound exposure as low as reasonably achievable, while optimizing diagnostic information.

ALARA, or As Low As Reasonably Achievable

With new ultrasound equipment, the output display lets us determine the exposure level in terms of the potential for bioeffects. For equipment that does not have an output display, we depend on whatever output information, such as intensity, dB, or percentage of power that the system provides.

Users control the total exposure to the patient.

Because the threshold for diagnostic ultrasound bioeffects is undetermined, it becomes our responsibility to control the total exposure to the patient. Controlling the total exposure depends on output level and exposure time. The output level required for an exam depends on the patient and the clinical need. Not all diagnostic exams can be performed at very low levels. In fact, using too low a level may result in poor data and the need to repeat the examination. Using too high a level may not increase the quality of the information, but it will expose the patient to unneeded ultrasound energy.

Q. If output level depends on the patient and the clinical need, what determines exposure time?

What determines exposure time?

A. Ultimately, the exposure time depends on the person conducting the exam. Primarily, it's our training, education, and experience that determine how quickly we can obtain a useful image, and thus, the length of the exam and the amount of exposure. So, the question is, "How much time do we need to obtain the desired diagnostic information?"

System Capabilities:
Operating mode
Transducer capabilities
System setup
Scanning techniques
Knowledge and experience

But there are also some other factors that might affect the length of time that any particular tissue is exposed. One is the mode, whether it's a moving or a stationary beam; and another is the choice of transducer. Other factors include the patient's body characteristics, the operator's understanding of the controls on the system and how they affect output levels, and whether it's continuous wave or pulsed Doppler, or color flow Doppler. To achieve ALARA, we need a thorough knowledge of the imaging mode, transducer capabilities, system setup, and operator scanning techniques.

Operating mode:
B-mode
M-mode
Doppler
Color flow Doppler

System capabilities include the following: mode, transducer capabilities, system setup, and scanning techniques. Let's talk about each. First, the mode we select, such as M-mode, B-mode, or Doppler, depends on what we're looking for. B-mode imaging gives anatomical information while Doppler and color flow Doppler modes give information about blood flow through vessels. M-mode gives information about how anatomical structures move in time.

Transducer capabilities:
Frequency
Penetration
Resolution
Field of view

Second, transducer capabilities relate to penetration at the frequency chosen, resolution, and the field of view that we can obtain with the selected transducer.

System setup:
Starting output power
Starting intensity outputs
Scanning results

Third, system setup and control settings depend on where we start on the output scale and on our knowledge of which combination of controls gets the best results.

Scanning techniques:
Anatomy and pathology
Ultrasound physics
Signal processing features
Recording and playback features

Fourth, the scanning technique we use is based on our knowledge of anatomy and pathology, of ultrasound physics, and of the equipment's signal processing features, plus our experience with a given scanning modality, such as sector, linear, and so forth. A system's recording and playback features let us reduce exposure time to just the time necessary to obtain a useful image. Analysis and diagnosis can be performed using recorded images rather than lengthy live imaging sessions.

ALARA is a simple concept and easy to understand. Implementing ALARA well, however, requires all of our knowledge and skills as diagnostic ultrasound users. In Part Three we will learn how many of the controls found on diagnostic ultrasound equipment can affect ultrasound output. Without an output display standard we must rely on that knowledge to estimate a patient's ultrasound exposure. With an output display standard we have a real-time indication of the exposure in terms of the potential for bioeffects. Either way, we implement ALARA by minimizing the exposure level and duration while being sure to obtain the necessary diagnostic information.

Part Three
Implementing ALARA

Chapter Six
Knobology

Issues Addressed:

- Basis of knobology
- Tradeoff between *in situ intensity* and image depth
- Operator controls and ALARA
- Prudent use
- Know the user's guide
- An example of implementing ALARA

Q. What should we know about equipment control features, "knobology", to implement ALARA?

A. Whether or not a diagnostic ultrasound system has an output display, the same types of controls are used to obtain the needed diagnostic images. We should understand how these controls affect acoustic output levels so we can use them to get the best image with the least exposure. In this chapter, we will learn about types of controls that are available on most ultrasound imaging equipment.

Q. How can the operator control ultrasound output?

Operator controls and ALARA

A. There are several external system controls the operator can adjust to improve the quality of the image and to minimize the output intensity. To understand how these controls are related to ALARA, let's divide them into three broad categories: First, controls that directly affect intensity. Second, controls that indirectly affect intensity. These are controls such as Mode, Pulse Repetition Frequency and others. When you change the setting for one of these controls, you may also be changing the intensity. Third, controls that do not affect intensity. We can think of the third category as "receiver controls." These are controls that affect the processing of ultrasonic echoes returned from the body.

These aren't "official" categories, but they help us understand how the knobs affect ALARA. In fact, each equipment manufacturer provides somewhat different sets of controls. By reviewing the user's guide for the equipment, we can determine the particular controls that perform the functions described here.

Let's look at controls that directly affect intensity. They are application selection and output intensity.

<u>Controls directly affecting intensity</u>
Application selection
Output intensity

Application selection

With application selection, we may choose from applications such as peripheral vessel, cardiac, ophthalmic, fetal imaging, and others. There may be different “ranges” of intensity output based on these applications. Selecting the right application range is the first thing you can do. For example, cardiac intensity levels are not generally recommended for performing a fetal scan. Some systems automatically select the proper range for a particular application, while others require a manual selection.

For equipment that does not have an output display, the maximum intensity for each application is regulated by the FDA. The FDA regulation is meant to limit ultrasonic output levels to ranges historically used for each application. But users have some choice in the matter; we are responsible for the proper selection of an application range.

For equipment with an output display, FDA currently regulates only the maximum output for the system. Manufacturers establish intensity ranges appropriate for typical patient examinations. However, within the system limits, users may override the application specific limits. We are responsible for being aware of the output level that is being used. We know the output level from the system’s real-time output display.

Output intensity or power

Another control that has a direct effect on intensity is, of course, output intensity. This control also may be called transmit, power, or output. Once the appropriate application range has been selected, the transmit intensity control increases or decreases the output intensity within the range. Most equipment allows you to select intensity levels less than maximum, say 25 or 50 percent. ALARA implies that you select the lowest output intensity that is consistent with good image quality.

Controls indirectly affecting intensity:
System mode
Pulse repetition frequency
Focusing depth
Pulse length
Transducer choice

Q. Which controls indirectly affect intensity?

A. The second group of controls is intended to change aspects of the transmitted ultrasonic field other than the intensity. However, because they change the field, the intensity is affected. Whether the intensity increases or decreases and by how much is difficult to predict.

System mode

The choice of B-mode, M-mode, or Doppler, for example, determines whether or not the ultrasound beam is stationary or in motion, which greatly affects the energy absorbed by the tissue. If the beam is moving, then each targeted tissue volume experiences the beam only for a fraction of the time, except near the transducer for sector scans. If the beam is stationary, then the period of time a targeted tissue volume in the beam receives ultrasound is increased.

Q. What about the pulse repetition frequency—PRF?

A. The number of ultrasound pulses in one second is referred to as the pulse repetition frequency. The higher the pulse repetition frequency, the more output pulses per second, increasing the temporal average intensity. There are several controls which have an effect on the pulse repetition frequency. For example, with some diagnostic ultrasound systems, if we decrease the focal range, then the system may automatically increase the PRF.

Pulse repetition frequency (PRF)

Q. Next on the list is focusing. How would focusing affect intensity?

Focusing depth

A. In focusing, the beam is narrowed in order to get a better lateral resolution, increasing the temporal average intensity. Most systems adjust their output to offset the effects of focusing, so they tend to maintain the same intensities. As an operator, we need to set the transducer focus at the depth of the structure we're examining. Different exams require different focal depths. Setting the transducer focus at the proper depth improves the resolution of that structure, and we don't need to increase intensity to see it better.

Q. What about pulse length?

Pulse length

A. Pulse length, sometimes called burst length or pulse duration, is the time the pulse is on. Often the longer the pulse, the greater the temporal-average intensity value, which both raises the temperature in the tissue and slightly increases the likelihood for cavitation. In pulsed Doppler, increasing the Doppler sample volume length usually increases the pulse length.

Q. Transducer choice is another factor that indirectly affects intensity. How?

Transducer choice

A. Tissue attenuation increases with transducer frequency. The higher the frequency, the higher the attenuation. That is, a higher-frequency transducer requires more output intensity to 'see' at a greater depth. In order to scan deeper at the same output intensity, a lower transducer frequency must be used. So, for deeper structures, if we find ourselves maximizing output and gain without obtaining good image quality, we may have to switch to a lower frequency.

Q. We are calling the third category Receiver Controls. We use these to improve image quality. They have no effect on output; they only affect how the ultrasound echo is received and processed. The controls include gain, TGC, video dynamic range, and post processing. Let's just look at one of these . . . system gain. How can we use receiver gain to implement ALARA?

Receiver Controls that affect <u>the image only</u>
Receiver gain
TGC
Video dynamic range
Post processing

Always increase the receiver gain first.

A. The receiver gain controls amplification of the return echo signal. To obtain good diagnostic information, we need a high return signal amplitude. This can be attained either by higher output, similar to talking louder, or by higher receiver gain, similar to a hearing aid with volume control. The need for gain is determined by tissue attenuation, that is, how much of the ultrasound is lost as it passes to the reflective surface and back to the transducer. In some cases, we control the receiver gain by setting the gain control or TGC. But in other cases, gain is automatically adjusted by the system when the user adjusts the output control. If the equipment has a receiver gain control, and we are searching for a weak signal, we should always increase the system's receiver gain first, then increase the power output. That way, we reduce the output required and make it less likely to use high acoustic intensities in the patient's body tissue. Remember, a low receiver gain may necessitate using a higher output, or result in suboptimal image quality.

Q. What is an example of the use of ALARA in a clinical exam?

A. Imagine we are getting ready to do a liver scan. It will involve the use of B-mode, color, and Doppler. Let's see how we would follow the ALARA principle to set up and conduct the exam.

Select transducer
Check output transmit setting
Adjust focus
Increase receiver gain
Adjust output transmit again

The first thing we need to do is select the appropriate transducer frequency. Next, we adjust the output intensity (or power) transmit setting. We check to make sure it is positioned at the lowest possible setting to produce an image. We adjust the focus to the area of interest, then increase the receiver gain to produce a uniform representation of the tissue. If we can obtain a good image by increasing the gain, we can lower the output and continue to increase the gain. Only after making these adjustments and if tissue penetration or echo amplitude levels are inadequate should we increase the output to the next higher level.

Minimize exposure time

After we have achieved a good B-mode image, then we can use color to localize the blood flow so we can position the Doppler sample volume. This allows us to locate the vessel of interest faster and that minimizes exposure time. Now that we have an image of the vessel, we position the range gate (or sample volume gate) over the vessel.

Adjust output transmit setting again

Now we check the Doppler trace. We adjust the power setting by setting the Doppler transmit intensity at the lowest possible level to produce a clear signal. We will make a few more adjustments, for example, adjusting the velocity scale. Now we increase the receiver gain to get a diagnostic signal. If maximum gain adjustments are inadequate, then we raise the output to the next higher level.

That basically is how we implement ALARA. Select the right transducer, start with a low output level, and obtain the best image possible by using focusing, receiver gain, and other imaging controls. If that is not adequate for diagnostic purposes, then increase the output level.

We can further implement ALARA by reducing total ultrasonic exposure time. That is, using our skill, experience, and knowledge of the patient, we can structure the exam to find and obtain useful images quickly. Recording and playing back parts or all of the exam for later measurement and analysis can further minimize the duration of the exposure.

Q. There are many different types of ultrasound systems with different controls and displays. Does ALARA change from system to system?

Some systems do not have an output control.
Different systems have different controls and displays.

A. ALARA remains the same. Keep ultrasound output "As Low As Reasonably Achievable." How we do that will change somewhat from system to system. For example, virtually all medical diagnostic ultrasound equipment has some type of acoustic output control. However, we may occasionally see a single purpose device that doesn't have an output adjustment. In this case, we practice ALARA by minimizing exposure time.

If the machine has an output control, we use it and the other controls to achieve ALARA. But remember, there are a variety of different types of intensity settings on ultrasound equipment, depending on the manufacturer's design. For example, some equipment may have a separate control on the keyboard or console that has discrete increments. Other equipment may have the intensity level adjustment accessed through the system presets. And, output settings may be displayed in a variety of different ways. For example, acoustic output may be expressed as a percentage of total power, in decibels, in intensity units of milliwatts per square centimeter, or in thermal or mechanical indices.

Acoustic output control:
percentage
decibel (dB)
Direct unit
(mW/cm^2 or mW)
Thermal index
Mechanical index

In addition to the technical aspect of ALARA, there's the philosophical aspect. This includes minimizing scan time, performing only required scans, and never compromising quality by rushing through an examination.

Q. We're responsible for patient care, and we must use diagnostic ultrasound prudently. What's the rule for prudent use?

A. We want the best diagnostic information with minimal exposure to the patient. And because the threshold at which ultrasound energy causes bioeffects is not known, our goal must be to adjust the intensity output of the equipment so as to get the most information at the lowest possible output level.

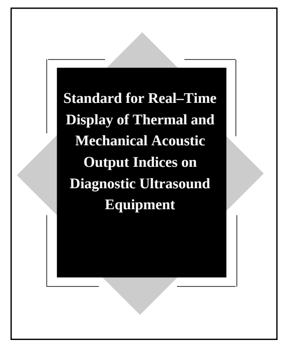
That’s what we mean by ALARA. Using settings that are “As Low As Reasonably Achievable” allow for the best quality ultrasound data for diagnosis.

Chapter Seven
The Output Display Standard

Issues addressed:

- Purpose of the Output Display Standard
- Mechanical Index (MI)
- Thermal Index (TI)
- Soft Tissue Thermal Index (TIS)
- Cranial Bone Thermal Index (TIC)
- Bone Thermal Index (TIB)
- When an Index is displayed
- What the Indices mean
- How to implement ALARA by using the Indices

Q. What is the output display standard?



A. One of many advances now being made in ultrasound equipment technology is the introduction of output display indices that relate to the potential for ultrasound bioeffects. These indices are specified in a standard developed in a cooperative effort by the National Electrical Manufacturers Association, the U.S. Food and Drug Administration, the American Institute of Ultrasound in Medicine, and many other medical and basic science societies.

Q. What is displayed?

A. Two types of indices may be displayed: a Thermal Index, or TI, which provides an estimate of the temperature increase; and a Mechanical Index, or MI, which provides an indication of the potential of nonthermal or mechanical bioeffects, such as cavitation.

Output Display
- Thermal Index (TI)
- Mechanical Index (MI)

Q. What is the purpose of the output display standard?

A. The goal of the output display standard is to make users aware of the actual output of their ultrasound equipment as it is being used. The TI and MI provide real-time information about the potential for bioeffects that can be used to help implement ALARA easily and efficiently. As users, we can quickly learn how different control settings change the indices. *We implement ALARA by obtaining needed information while keeping the indices, the potential for bioeffects, "as low as reasonably achievable."*

MI is a relative indicator of the potential for mechanical effects

Q. What is the Mechanical Index?

A. Scientific evidence suggests that mechanical, or nonthermal, bioeffects, like cavitation, are a threshold phenomenon, occurring only when a certain level of output is exceeded. However, the threshold level varies, depending on the tissue. The potential for mechanical effects is thought to increase as peak pressure increases, but to decrease as the ultrasound frequency increases. The Mechanical Index automatically accounts for both pressure and frequency. When interpreting the Mechanical Index, remember that it is intended to estimate the potential for mechanical bioeffects. The higher the index reading, the larger the potential. However, neither MI = 1, nor any other level, indicates that a bioeffect is actually occurring. We should not be alarmed by the reading, but we should use it to implement the ALARA principle.

Q. What is the Thermal Index?

	Scanned Mode	Unscanned Mode
Soft Tissue	TIS at Surface	TIS Small Aperture Large Aperture
Bone at Focus	TIS at Surface	TIB
Bone at Surface	TIC	TIC

A. Actually, there are three Thermal Indices that are used for different combinations of soft tissue and bone in the area to be examined. The purpose of the Thermal Indices is to keep us aware of conditions that may lead to a temperature rise whether at the surface, within the tissues, or at the point where the ultrasound is focusing on bone. Each Thermal Index estimates temperature rise under certain assumptions.

Three Thermal Indices
- Soft Tissue Thermal Index (TIS)
- Cranial Bone Thermal Index (TIC)
- Bone Thermal Index (TIB)

The Soft Tissue Thermal Index, known as TIS, provides information on temperature increase within soft homogeneous tissue. The Cranial Bone Thermal Index, called TIC, indicates temperature increase of bone at or near the surface, such as may occur during a cranial exam. The Bone Thermal Index, or TIB, provides information on temperature increase of bone at or near the focus after the beam has passed through soft tissue. For example, TIB is appropriate when focusing near fetal bone during a second or third trimester exam.

TI is a relative indicator of temperature increase

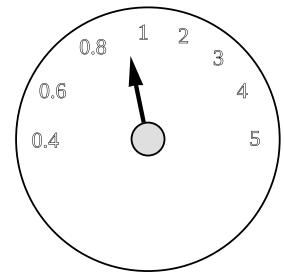
The Thermal Index is a relative indicator of temperature rise. Thus, a TI reading of 2 represents a higher temperature rise than a TI reading of 1. However, a TI of 1 should not be taken literally to mean an actual increase in temperature of 1°C, nor should a TI of 2 be taken to mean an increase of 2°C. The actual increase in temperature in the patient is influenced by a number of factors such as tissue type, blood perfusion, mode of operation, and exposure time. Those who developed the standard deliberately chose the term “Index” to avoid a literal association between the TI reading and actual temperature increase. The TI does, however, provide important information to the user: itindicates that the possibility for an increase in temperature exists, and it provides a relative magnitude that can be used to implement ALARA.

Q. How and when are the output indices displayed?

A. The output display must be located so as to be easily seen by the operator during an exam. An output display is not required if the transducer and system are not capable of exceeding an MI or TI of 1. However, if the transducer and system are capable of exceeding an MI or TI of 1, then it must display values as low as 0.4 to help the user implement ALARA.

No display of any index value is required if the transducer and system are not capable of exceeding an MI or TI of 1

The standard only requires that a single index be displayed at any one time. For some modes and application presets the user may be able to choose which index shall be displayed. For example, the Mechanical Index will appear for B-mode imaging if no other mode is active. A Thermal Index will be shown for all other modes, including modes where B-mode imaging is combined with something else such as M-mode, Doppler, or color flow imaging. The standard makes an exception for transducers that have no B-mode imaging. In that case, the Mechanical Index must be available in the Doppler mode.



A display of an index value as low as 0.4 is required if the transducer and system are capable of exceeding an MI or TI of 1.

The Mechanical Index is required for B-mode imaging because the mechanical effects, such as cavitation, are more likely to be significant than thermal effects. Similarly the rationale for using a Thermal Index in the other modes is that the potential for heating is the greater concern.

Q. Are there other system features required by the output display standard?

A. The output display standard requires manufacturers to provide default settings on their equipment. These settings establish the output level that will be used automatically at power-up, entry of new patient information, and a change from nonfetal to fetal application presets. Once the exam is under way, the user should adjust the output level as needed to achieve clinically adequate images while keeping the output index as low as possible.

Manufacturers are required to provide default settings

Q. Is it really that simple? All we need to know is the output index value?

A. Yes and no. A high index value does not always mean high risk, nor does it mean that bioeffects are actually occurring. There may be modifying factors which the index cannot take into account. But, high readings should always be taken seriously. Attempts should be made to reduce index values but not to the point that diagnostic quality is reduced.

The indices do not take *time* into account. Exposure time is an important factor users must keep in mind, especially if the index is in a

Minimizing exposure time will help reduce risk

range that might be considered high. Exposure time is the ultrasound exposure time at a particular tissue region. In all cases, minimizing ultrasound exposure time will help reduce risk.

Every patient is different. The tissue characteristics assumed in the formulas for the output display indices may differ significantly from the characteristics of the patient or exam type. Important characteristics we should consider include

- body size
- blood flow (or perfusion)
- the distance the organ of interest is from the surface
- where the bone is in relation to the beam axis and focal point, and
- factors, such as the presence or absence of fluid, that affect the attenuation of ultrasound.

Q. Tell us in more detail how to use the output display to help implement ALARA.

A. Let's look at the basic principles to follow. To begin, we determine if we are displaying the appropriate index. The Mechanical Index and Thermal Index are mode-specific, so that index selection is automatic. However, there may be cases when we can override the system's choice. When displaying a Thermal Index, we should ask four questions.

Thermal Index	Tissues	Typical Examinations
TIS	Soft tissue	Cardiac, first trimester fetal
TIB	Bone near focus	Second and third trimester fetal
TIC	Bone near surface	Transcranial

First, "Which Thermal Index is appropriate for the study we are performing—TIS, TIC, or TIB?" TIS is appropriate when imaging soft tissue and is used, for example, during first trimester fetal exams or in cardiac color flow imaging exams. TIC is used during transcranial examinations. And TIB is used when the focus is at or near bone and may be appropriate for second and third trimester fetal exams or certain neonatal cephalic exams.

The second question to ask is, "Are there modifying factors that might create either an artificially high or low reading?" These modifying factors include the location of fluid or bone and blood flow. For example, is there a low attenuation path so that the actual potential for local heating is greater than the TI display? This could be caused by an unusually long distance of amnioti, or other fluid through which the ultrasound must travel. Another example is that a highly perfused tissue area may have a lower temperature than indicated because blood flow transports heat away from the tissue.

Third, even if the index value is low, we should ask, “Can I bring it down?” Because there is uncertainty about how high is “too high,” we should always be alert to ways to adjust the system to reduce the indices. In many cases, an index reading can be reduced without decreasing the quality of the image.

Finally, we should ask, “How can we minimize ultrasound exposure time without compromising diagnostic quality?” This does not mean that we rush through the exam and take the chance of not getting information necessary for an accurate diagnosis. It means that we should get the best image possible with as little exposure time as necessary. There are a number of ways to reduce exposure time. For example, if the system does not disable pulsing during freeze frame, remove the transducer from the patient while working with a frozen image on the ultrasound display. Don’t scan obstetrical patients twice, once to obtain necessary diagnostic information and again to show images to the patient’s family and friends. Only scan areas of the body that are necessary to the diagnosis. And don’t use additional modes, such as Doppler or color, unless they benefit the diagnosis.

Q. Please give us some examples that show how the indices can be used to implement ALARA.

A. We will look at several examples. When we consider the Mechanical Index, the MI might be reduced by selection of appropriate transducer type, ultrasonic frequency, focal zone, and receiver gain.

Implementation of ALARA by using the Indices

Because there are three Thermal Indices, it is not so simple. As we go through the examples, remember the four questions we should ask related to the Thermal Index:

- Which TI?
- Are there modifying factors?
- Can we reduce the index value?
- Can we reduce the exposure time?

The first example is a color flow scan of the portal vein of the liver. TIS is the appropriate selection for nonobstetrical abdominal examinations. Possible modifying factors include capillary perfusion and body size. High perfusion in the imaged tissue will reduce thermal effects while conversely, a lack of perfusion may increase them. With increasing body size, extra tissue attenuation decreases mechanical and thermal effects at the focus. Also, when considering the focus for a soft tissue exam, remember that the potential for maximum heating might occur at the surface, at the focal point, or somewhere in between. For scanned modes, such as B-mode imaging and color flow, and for sector transducers, the maximum heating is usually close to the surface.

The second example is a pulsed Doppler cardiac exam. Again, TIS is the appropriate thermal index. The cooling effect of cardiac blood flow is a very important modifying factor. Actual increase in cardiac temperature is almost certainly less than the TIS indicates.

The next example is a second trimester pulsed Doppler fetal exam. In most cases with unscanned modes, like pulsed Doppler, the Thermal Index indicates heating near the surface. If bone is not present, maximum heating is likely to occur between the surface and the focus or sample volume, and the TIS is the relevant index. But, if bone is present, maximum heating will occur at the location of the bone. In this example, the TIB is the relevant index, although it will overestimate the actual temperature rise, unless the bone is located within the focal zone or sample volume.

The presence of fetal bone near the focal zone is the important factor. If the pulsed Doppler is used to measure umbilical blood flow, and we are sure there is no bone near the sample volume, the TIS is appropriate. However, because the transducer may be moved, it is usually best to make the more conservative choice and select TIB for all second and third trimester exams. Of direct concern are the fetus's developing neural tissues, such as the brain and spinal cord, that may be in a region of heated bone.

Other modifying factors include the type of overlying tissue, whether fluid or soft tissue, and the exposure time at the particular tissue region. The presence of fluid is important, because if more than half of the path is fluid-filled then the actual temperature rise may be higher than the TIB value displayed. To reduce the potential temperature rise, consider aiming the transducer to miss most of the bone structure without losing the region of interest, if possible, and optimize receiver gain and sample volume controls.

An additional consideration is whether heating is likely to be near the surface (in the mother's tissues) or deeper (in the fetal tissues). This depends mostly on whether we are using a scanned (2D or color) or unscanned (M-Mode or Doppler) mode. For scanned modes, heating tends to be near the surface; for unscanned modes, closer to the focal zone. However, in most cases where bone is along the beam axis, maximum heating occurs at the location of the bone.

Another example is a transcranial examination, where TIC is the appropriate Thermal Index. The presence of bone near the surface is the important factor in this case. To reduce the TIC reading, consider scanning through a thinner part of the skull, so that a lower output setting can be used.

The final example is a neonatal cephalic exam. The choice of Thermal Index depends on the location of bone. Generally, in an exam through the fontanelle TIB is the appropriate index because of the chance of focusing near the base of the skull. TIS might be appropriate if the focal zone will always be above the base of the skull. If the exam is through the temporal lobe, the temporal bone near the surface makes the TIC the appropriate index.

Conclusion

In more than three decades of use, there has been no report of injury to patients or to operators from medical ultrasound equipment. We in the ultrasound community want to keep that level of safety.

In the past, application-specific output limits and the user’s knowledge of equipment controls and patient body characteristics have been the means of minimizing exposure. Now, more information is available. The Mechanical and Thermal Indices provide users with information that can be specifically applied to ALARA. Mechanical and Thermal Indices values eliminate some of the guesswork and provide both an indication of what may actually be happening within the patient and what occurs when control settings are changed. These make it possible for the user to get the best image possible while following the ALARA principle and, thus, to maximize the benefits/risk ratio.